DIRECT TESTIMONY OF

NATHAN V. BASS, PLA

ON BEHALF OF

SOUTH CAROLINA ELECTRIC & GAS COMPANY

DOCKET NO. 2018-197-E

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Nathan V. Bass. My business address is 123 North White Street, Fort Mill, South Carolina 29715.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Pike Engineering, LLC (f/k/a UC Synergetic, LLC) ("Pike Engineering"), a wholly owned subsidiary of Pike Corporation, as Manager of the Facilities Planning & Siting ("FPS") division. Pike Engineering, with approximately 1,450 employees in 34 offices located in 16 states, provides electrical transmission and distribution systems planning, siting, permitting, engineering and project management services to electrical utility clients throughout the United States.

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL BACKGROUND, PROFESSIONAL ASSOCIATIONS, AND BUSINESS EXPERIENCE.

From North Carolina State University, I received a Bachelor of Science degree in horticulture with a concentration in landscape design in 2008 and a Master of Landscape Architecture degree in 2010. I was employed by Pike Energy Solutions, LLC (now known as Pike Engineering, LLC) as a landscape architect in the FPS division in February 2011 and became manager of that division in January of 2017. As manager of FPS, I am responsible for directing the division's delivery of services that include siting electrical transmission lines and substations, civil engineering (specifically, civil site design and stormwater management planning and design), environmental assessments and planning, visual impact studies and mitigation planning, cultural resource studies, landscape architectural planning and design and project permitting and licensing.

Since 1987, the FPS division, which was previously a department within Duke Energy, has executed and managed the successful siting, permitting and licensing of more than 200 transmission lines, virtually all of which are located in North and South Carolina. I served as the FPS project manager for the services rendered to SCE&G on the Graniteville #2 – South Augusta 230 kV Tie Line and Urquhart – Graniteville 230 kV Line project and have personally participated in more than 30 transmission line siting and permitting projects.

I am a licensed professional landscape architect in the states of South Carolina and North Carolina and have achieved North Carolina State University

sponsored Stormwater Best Management Practices Inspection and Maintenance Certification, which is a supplement to my professional licenses.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to discuss the transmission line siting methodology that South Carolina Electric & Gas Company ("SCE&G"), in collaboration with FPS, utilized to evaluate the route for the Pepperhill – Summerville 230 kV Line, the Williams – Pepperhill 230 kV Line Segment, and the Canadys – Faber Place 230 kV Line Segment (collectively, the "Lines") and associated facilities. My company conducted studies, compiled data and analyzed extensive information regarding environmental, land use, cultural resource, and visual effects, if any, that will result from constructing the proposed Lines.

Q. DO YOU HAVE ANY DOCUMENTS THAT SUPPORT OR ILLUSTRATE YOUR TESTIMONY?

A. Yes. As SCE&G's siting and project permitting consultant, I am the author of the *Transmission Line Siting and Environmental Report for the Pepperhill – Summerville 230 kV Line, Williams – Pepperhill 230 kV Line Segment and Associated Facilities*, dated May 2018 and attached to this testimony as Exhibit No. __ (NVB-1). This report details the need for the Lines and associated facilities and the research and studies conducted regarding the environmental, land use, cultural resource, and visual effects of the Lines and the associated facilities. Although not

specifically referenced in the title of the report, the cultural resources, wetlands, and protected species studies cover the area of the new Canadys – Faber Place 230 kV Line Segment, which is approximately 350 feet long.

Q. PLEASE DESCRIBE THE ROUTE FOR THE PROPOSED LINES.

A. The Pepperhill – Summerville 230 kV Line will originate at the Company's Summerville 230/115 kV Substation terminal near Summerville, South Carolina, and will run southeast within existing, cleared SCE&G right-of-way for approximately 2.9 miles before reaching the northern boundary of the Exchange Park. After running south through the Exchange Park for approximately 0.5 miles, the Pepperhill – Summerville 230 kV Line will turn slightly south-southeast and run for approximately 0.6 miles before reaching an angle point just north of Ancrum Road. At the angle point north of Ancrum Road, the Pepperhill – Summerville 230 kV Line will turn south and run for approximately 0.1 miles, crossing Ancrum Road before reaching the Ladson Junction. From the southern boundary of the Summerville 230/115 kV Substation to the Ladson Junction, the Pepperhill – Summerville 230 kV Line will share a single-pole, double-circuit ("SPDC") structure with the Williams – Summerville 230 kV Line.

From the Ladson Junction to the Pepperhill 230/115 kV Substation, the Pepperhill – Summerville 230 kV Line will share SPDC structures with the Williams – Pepperhill 230 kV Line Segment, which will consist of the

approximately 3.5-mile rebuilt segment of the Williams – Canadys 230 kV Line. These lines will run approximately 0.2 miles to a crossing over U.S. Highway 78 and then approximately 1.2 miles to a crossing over the Southern Railroad. It will continue south for approximately 0.7 miles and then turn slightly south-southeast for approximately 1.3 miles before reaching the northern boundary of the Pepperhill 230/115 kV Substation. The Pepperhill – Summerville 230 kV Line will continue alone around the western boundary of the Pepperhill 230/115 kV Substation before terminating into the southern side of the substation. From the northern boundary of the Pepperhill 230/115 kV Substation, the Williams – Pepperhill 230 kV Line Segment will continue south for approximately 1,000 feet on single-pole, single-circuit structures to its terminal in the Pepperhill 230/115 kV Substation.

The Canadys – Faber Place 230 kV Line Segment will run approximately 350 feet in existing right of way contiguous to the Pepperhill 230/115 kV Substation. This segment will be connected to existing Pepperhill – Faber Place 230 kV Line after that line is disconnected from its 230 kV terminal at the Pepperhill Substation and to the remaining portion of the existing Williams – Canadys 230 kV Line after the other portion of the Williams – Canadys 230 kV Line is terminated at the Pepperhill 230/115 kV Substation to form the Williams – Pepperhill 230 kV Line Segment.

Q. WILL THE PROPOSED LINES AND ASSOCIATED FACILITIES HAVE ANY SIGNIFICANT SHORT- OR LONG-TERM ENVIRONMENTAL IMPACTS?

A. No. As explained in more detail in the revised Transmission Line Siting and Environmental Report, the construction and operation of the Lines will not have any significant short- or long-term impacts on the environment.

Q. WHAT WAS THE CONCLUSION OF THE STUDIES THAT WERE CONDUCTED FOR LINES AND ASSOCIATED FACILITIES TO DETERMINE EFFECTS TO RARE, THREATENED AND ENDANGERED SPECIES?

A. Palmetto Environmental Consulting, Inc. ("PEC") conducted a protected species literature and records search on April 2, 2012, and updated the search on April 19, 2018, to determine the presence of known occurrences of federally- and state-listed animal and plant species on or within one mile of the right-of-way within which the Lines will be located and within one mile of the Pepperhill and Summerville properties the Lines will cross. The literature and records search revealed no federally-listed species within one mile of the project and the following state-listed species within one mile of the project: one known occurrence of least tern, two occurrences of yellow fringeless orchid, one occurrence of green fringe orchid, one occurrence of crestless plume orchid, and one occurrence of scarlet Indian-paintbrush. None of the occurrences of state-listed species are located in the

existing right-of-way or portions of the substation properties the Lines will cross. SCE&G also engaged PEC to conduct a field investigation of the Lines' routes to verify the presence or absence of state- and/or federal-listed species and none were found.

Due to the confirmed absence of protected species in the existing right-of-way and on the substation properties and due to no changes in potential habitat for listed species, no adverse effects to rare, threatened or endangered animal or plant species will occur as a result of construction and operation of the Lines.

Q. PLEASE DESCRIBE THE IMPACTS TO WETLANDS OR STREAMS, IF ANY, THAT WILL RESULT FROM CONSTRUCTION AND OPERATION OF THE LINES AND ASSOCIATED FACILITIES.

A. Because of the use of existing, established right of way, construction and operation of the Lines and associated facilities will have no significant short- or long-term impacts to wetlands or streams. Based on wetland surveys and delineations conducted by PEC and verified by the U.S. Army Corps of Engineers, approximately 54.4 acres of wetlands reside in the right-of-way and on portions of the Pepperhill and Summerville Substation properties within which the Lines will be built. Also, approximately 295 linear feet of stream channels are present in the right-of-way.

To the extent practical, SCE&G will design the Lines to span wetlands; however, where structures may be required in wetlands, access to them for

construction purposes will be accomplished on mats, vibratory caisson type foundations will be utilized, and no permanent roads will be constructed in the wetlands. No fill will be placed in wetlands, and the function of wetlands crossed by the Lines will not be changed.

The Lines will cross several streams. Any existing low-growing vegetation in stream buffer zones presently beneath the existing lines in the right-of-way will be retained; therefore, clearing in stream buffer zones will not likely be required.

Construction of the Lines will present a minor potential for erosion and runoff contributions to nearby streams and wetlands; however, the use of existing, established right-of-way significantly minimizes this potential impact. SCE&G will carefully design and implement measures and plan work to prevent any sediment-laden runoff beyond designed erosion control devices (sediment traps, silt fences, etc.); and SCE&G will comply with the South Carolina Stormwater Management and Sediment Reduction Act related to water quality protection and will consider the recommendations of various regulatory agencies, including the South Carolina Department of Natural Resources, South Carolina Department of Health and Environmental Control, the U.S. Army Corps of Engineers, etc.

SCE&G will apply its longstanding practices and procedures for operations within wetlands and riparian areas, which have proven to be effective in preventing temporary, construction-related impacts to wetlands, and all activities will be conducted in a manner that will not jeopardize South Carolina water quality standards and existing water uses. The erosion control measures and Best

Management Practices employed will be sufficient to prevent any sediment movement beyond construction limits during a 10-year storm event. Measures will also be taken to prevent sediment, trash, debris, and other man-made pollutants from entering sensitive areas.

Before construction begins on the Pepperhill – Summerville Line, Williams – Pepperhill Line Segment and Canadys – Faber Place 230 kV Line Segment, construction plans will be provided to supervisors that will show structure locations and any sensitive areas, including stream buffers and wetlands. Any required state and/or federal permits related to wetlands and water quality protection will be obtained before construction begins, and periodic inspections will be performed during construction to ensure compliance with planned environmental protection measures and all permit conditions.

Q. WHAT WAS THE CONCLUSION OF THE CULTURAL RESOURCE INVESTIGATION THAT WAS CONDUCTED ALONG THE ROUTE OF THE LINES AND ASSOCIATED FACILITIES?

A. Pike Engineering, on SCE&G's behalf, engaged Brockington and Associates, Inc. ("Brockington") to conduct a cultural resource records review and windshield reconnaissance survey in April 2012, a Phase I archaeological investigation in 2014 and, lastly, an additional records review, Phase I architectural investigation and windshield reconnaissance survey in 2018. It should be noted that

the 2018 windshield reconnaissance survey completely supersedes the one completed in 2012 and, consequently, my testimony only refers to the 2018 survey.

In April 2012, Brockington conducted background research to identify all previously recorded archaeological and architectural resources that reside within the vicinity of the Lines' routes (within 0.5 miles of the Lines for archaeological resources and within 1.25 miles for architectural resources). Moreover, the scope of Brockington's 2012 work included a windshield reconnaissance survey to inspect previously recorded architectural resources within 1.25 miles of the Lines' routes and to identify any previously unrecorded resources within 1.25 miles of the Lines' routes that appear potentially eligible for listing in the National Register of Historic Places ("NRHP").

Brockington conducted a Phase I archaeological investigation within the right-of-way of the Pepperhill – Summerville 230 kV Line in May and July 2014. The 2014 Phase I investigation included the area that will be crossed by the Canadys – Harber Place 230 kV Line Segment.

In April 2018, Pike Engineering again engaged Brockington to conduct a Phase I archaeological investigation within the right-of-way of the last 1,000 feet of the Williams - Pepperhill Line Segment, which was not included in the 2014 investigations. The 2014 and 2018 Phase I archaeological investigations included the areas on the Pepperhill and Summerville Substation properties that will be affected by the Lines' connection to the substations.

During the 2014 investigation, Brockington visited three previously recorded archaeological sites. Brockington determined that two of the sites are no longer present and recommended that the remaining site—an extensive inland rice dike system located near the east end of McClhune Branch—should remain eligible for the NRHP and that placement of transmission structures be planned to avoid ditches and embankments that are elements of the rice dike system. The 2014 Phase I archeological investigation revealed no additional archaeological sites that should be classified as eligible or potentially eligible for the NRHP and taken into consideration during planning and construction of the Lines. The findings of the 2014 Phase I archaeological investigation were summarized in a report prepared by Brockington entitled Cultural Resources Survey of the Summerville-Pepperhill 230 kV Transmission Line and submitted to the State Historic Preservation Office ("SHPO") for review. The SHPO issued a letter concurring with Brockington's findings on September 8, 2014.

Consistent with Brockington's recommendation, SCE&G will design the Lines to span the elements of the rice field embankments and ditches in the right-of-way, and no tree clearing will be required within or near the site. As such, the site will not be disturbed during construction or operation of the Lines.

The Phase I archaeological investigation conducted in 2018 confirmed that no archeological resources are present along the last 1,000 feet of the Williams – Pepperhill 230 kV Line Segment. Consequently, no adverse effects to

archaeological resources will occur as a result of construction and operation of the Lines and associated facilities.

Immediately prior to the 2018 windshield reconnaissance survey, Brockington conducted a records review and determined that 116 architectural resources were documented to reside within 1.25 miles of the proposed Lines' routes, two of which are classified as NRHP Eligible. No architectural properties designated as "National Historic Landmarks" or "Historic Districts" are recorded within 1.25 miles of the routes of the Lines.

During the windshield reconnaissance survey conducted in April 2018, Brockington visited each of the 116 previously recorded architectural resources. Brockington determined that five of the documented resources have been demolished; three of the documented resources that were documented to be ineligible for NRHP should be considered eligible for NRHP for planning purposes; one documented resource that was classified as not eligible for the NRHP should be classified as potentially eligible for the NRHP; and two undocumented resources should be classified as potentially eligible for NRHP and added to the list of documented resources.

Brockington concluded that it is unlikely that any of the four resources they believe should be reclassified as eligible/potentially eligible or the two previously undocumented resources they believe should be classified as potentially eligible for NRHP will have a view of the proposed Lines. Additionally, following the windshield survey Brockington completed in 2012, Pike Engineering, working

closely with Brockington, conducted a viewshed analysis to determine the footprint of the geographic area within 1.25 miles of the Pepperhill – Summerville 230 kV Line's route where views of the future line may be possible. The analysis was based on line design assumptions that included the approximate locations and heights of the new 230 kV transmission line structures that will be utilized on the Pepperhill – Summerville 230 kV Line. Computer modeling was completed based on the top elevation of each line structure, taking into consideration topography and vegetation, to display geographic areas surrounding the proposed Lines where visibility of it will be likely and not likely. This mapping displayed the entire area surrounding the future lines within which the 111 (116 resources less the five that have been demolished) previously documented historic resources are located. Pike Engineering conducted a visual impact analysis from each of the two resources on the list that are currently classified as eligible for the NRHP and also completed the visual analysis for each of the four previously documented resources Brockington believes should be reclassified as eligible/potentially eligible for the NRHP. Following the computerized view probability analysis, landscape architects visited each of the resources that were analyzed in the viewshed analysis to confirm the accuracy of the predicted view probability. As indicated by the computerized view analysis and confirmed during the field visit, none of the resources within 1.25 miles of the Pepperhill – Summerville 230 kV Line classified as NRHP eligible will have a view of the proposed Lines. Likewise, none of the resources on the South Carolina

Department of Archives & History list Brockington believes should be reclassified to as eligible/potentially eligible will have a view of the Lines.

Given the systematic approach SCE&G has executed to date and will exercise during construction of the Lines to identify and protect cultural resources, no adverse impacts are anticipated.

Q. WHAT WILL BE THE VISUAL EFFECTS OF THE PROPOSED LINES AND ASSOCIATED FACILITIES?

A. The Lines will have very low overall visual effects for the following five primary reasons:

- The Lines will share an existing SCE&G right-of-way with other existing transmission lines for their entire lengths;
- The SPDC structures that will be used to construct the Pepperhill – Summerville 230 kV Line will replace existing 230 kV single-circuit wooden H-frame structures for the entire length of the Line;
- The segment of the Pepperhill – Summerville 230 kV Line north of the Ladson Junction will reside in an area where visual conditions are highly modified by residential, commercial, industrial, and institutional development;
- The segment of the Pepperhill – Summerville 230 kV Line south of the Ladson Junction will run through a generally remote area where existing trees will reside on each side of the right-of-way for virtually all of the distance; and

- The last 1,000 feet of the Williams – Pepperhill 230 kV Line Segment and the Canadys – Faber Place 230 kV Line Segment will be constructed in right-of-way immediately adjacent to the Pepperhill Substation and alongside existing 115 kV and 230 kV transmission lines. The visual character of the area is modified by electrical transmission infrastructure and any additional modification resulting from the Lines will be negligible.

It is my professional opinion that the Lines and associated facilities will have no adverse visual effects to the region.

Q. IS THE IMPACT OF THE PROPOSED LINES AND ASSOCIATED FACILITIES UPON THE ENVIRONMENT JUSTIFIED CONSIDERING THE STATE OF AVAILABLE TECHNOLOGY AND THE NATURE AND ECONOMICS OF THE VARIOUS ALTERNATIVES?

A. Yes. Because SCE&G has made the decision to build the Lines entirely within existing SCE&G right-of-way, the resulting environmental, land use, cultural resource, and aesthetic effects are minimized. Moreover, as Witness Richards states in his testimony, SCE&G considered several alternatives to the proposed Lines and associated facilities and determined that the proposed facilities are the superior solutions to provide its customers with long-term electrical system reliability.

Q. IN YOUR PROFESSIONAL JUDGMENT, WAS SCE&G'S DECISION TO USE THE EXISTING RIGHT OF WAY ROUTE, INSTEAD OF EVALUATING OTHER GREENFIELD ROUTES, FOR THE LINES PROPER?

A. Yes. In my professional judgment, SCE&G's decision to use the existing right-of-way route for the Lines was proper.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

SOUTH CAROLINA ELECTRIC & GAS COMPANY

Cayce, South Carolina

TRANSMISSION LINE SITING and ENVIRONMENTAL REPORT

for the

PEPPERHILL – SUMMERVILLE 230 KV LINE,

WILLIAMS - PEPPERHILL 230 KV LINE SEGMENT

and

ASSOCIATED FACILITIES

Berkeley and Charleston Counties, South Carolina

May 2018

Prepared for SCE&G by:

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1.0 Project Need and Justification

1.1 Introduction and Background Information

South Carolina Electric & Gas Company ("SCE&G" or "Company") has prepared this report pursuant to The South Carolina Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-10 et seq. (2015) for the following two 230 kilovolt ("kV") lines:

1. A new 230 kilovolt ("kV") transmission line that will be approximately 7.8 miles in length that is proposed to be built in existing SCE&G right-of-way between SCE&G's existing Pepperhill 230/115 kV Substation ("Pepperhill Substation") in North Charleston, South Carolina, and its existing Summerville 230/115 kV Substation ("Summerville Substation") near Summerville, South Carolina.
2. The second new 230 kV line will be a short segment (approximately 1,000 feet in total length) that is necessary to reterminate the existing Williams - Canadys 230 kV Line at the Pepperhill Substation. When terminated at Pepperhill, this line will become the Williams - Pepperhill 230 kV Line. The new line segment of the Williams - Pepperhill 230 kV Line will be constructed in SCE&G's existing right-of-way that is contiguous to the Pepperhill Substation property.

Throughout this report, the proposed new 230 kV line running between the Pepperhill and Summerville Substations will be referred to as the "**Pepperhill - Summerville 230 kV Line**" or "**Pepperhill - Summerville Line.**" The proposed new 230 kV line segment of the line that will become the Williams - Pepperhill 230 kV Line is referred to as the **"Williams - Pepperhill Line Segment"** throughout this report. Individually, each of the proposed new lines is referred to as "**Line**" at various places in this report. Collectively, they are referred to as "**Lines**."

The Pepperhill - Summerville Line will be accommodated entirely within an existing SCE&G right-of-way by removing single-circuit H-frame structures that support segments of two existing 230 kV lines that, when combined, run the full distance between the Pepperhill and Summerville Substations. The segments of the existing 230 kV lines will then be rebuilt onto the single-pole, double-circuit 230 kV structures that will support the Pepperhill - Summerville 230 kV Line.

The Williams - Pepperhill Line Segment will utilize single-pole, single-circuit 230 kV structures and will be built entirely within existing SCE&G right-of-way that is contiguous to the Pepperhill Substation property.

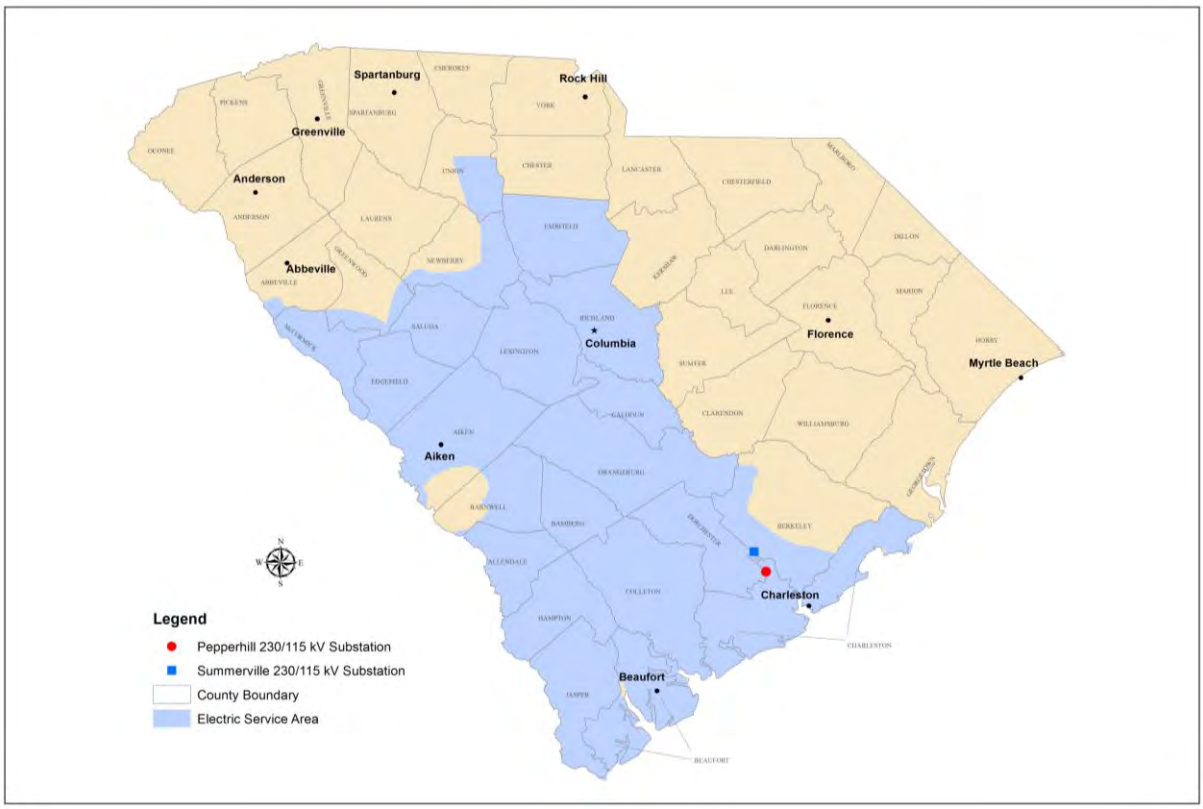
Associated facilities that will be added to SCE&G's transmission system to accommodate the Pepperhill - Summerville Line will include one new 230 kV line terminal at the Pepperhill Substation and one new 230 kV line terminal at the Summerville Substation.

Concurrent with the addition of the Pepperhill – Summerville 230 kV Line, Williams – Pepperhill Line Segment and associated facilities to its transmission system, SCE&G will complete additional modifications at the Pepperhill Substation that will improve power flow in the southern region while facilitating the addition of the two proposed Lines (see Section 1.4).

Failure to add the Pepperhill – Summerville 230 kV Line, Williams – Pepperhill Line Segment and associated facilities to its transmission system could result in unacceptable thermal loading and system operating limit violations on the electrical transmission system in the southern portion of SCE&G's electric service area as early as May 2020.

SCE&G, a wholly-owned subsidiary of SCANA Corporation, supplies electrical energy to approximately 727,000 customers throughout its 17,000-square mile electric service area[1] that includes all or portions of 24 counties in central and southern South Carolina as illustrated in Figure 1.1-1.

Figure 1.1-1: SCE&G Electric Service Area



[1] SCE&G provides natural gas service throughout its 17,000-square mile electric service area and, additionally, provides natural gas service only in 14 additional counties comprising approximately 5,000-square miles.

1.2 Process Used by SCE&G to Determine the Need for New and Upgraded Electrical Transmission Facilities

SCE&G uses external and internal criteria to guide decision-making related to the development of new or upgraded electric transmission facilities. Externally, SCE&G subscribes to the Transmission Planning Standards established by the North American Electric Reliability Corporation ("NERC") and, internally, SCE&G adheres to its Long Range Planning Criteria. In accordance with these standards and criteria, SCE&G's transmission system is designed so that nothing more serious than local load impacts will occur during certain contingencies. Also, SCE&G's transmission system is designed so that after appropriate switching and re-dispatching following contingencies, all non-radial electrical loads can again be served with reasonable voltages, and all facilities can again operate within acceptable system operating limits. Examples of contingencies SCE&G considers when planning, designing and analyzing performance on its electrical transmission system include, but are not necessarily limited to, the following:

1. Loss of any electrical generator;
2. Loss of any transmission circuit operating at a voltage level of 115 kV or above;
3. Loss of any transmission transformer;
4. Loss of any electrical bus and associated facilities operating at a voltage level of 115 kV or above;
5. Loss of all 115 kV or above circuits on a common structure;
6. Loss of entire generating capacity in any one generating plant;
7. Loss of any generating unit simultaneously with the loss of a single transmission line;
8. Loss of all components associated with a transmission circuit breaker failure; and,
9. Loss of any generator, transmission circuit, or transmission transformer, followed by manual system adjustments, followed by the loss of another generator, transmission circuit, or transmission transformer.

SCE&G conducts system analyses on a continuing basis to test its transmission system for compliance with the NERC standards and its internal Long Range Planning Criteria. Whenever the system analyses indicate single or multiple contingency occurrences would cause transmission system overloading and/or violations of acceptable system operating limits, modifications to the system must be completed to prevent the specific contingency or contingencies and/or the adverse effects thereof.

1.3 Determining and Defining Project Need

Recent power flow studies conducted by SCE&G have identified a possible future single contingency occurrence (N-1 contingency) in the southern region of its service area that would constitute violations of both NERC Transmission Planning Standards and SCE&G's Long Range Planning Criteria as early as May 2020. Specifically, the N-1 contingency would be an outage of the

230 kV #2 Bus at the Summerville 230/115 kV Substation that would result in the loss of service of one 230/115 kV transformer at the Summerville Substation and thermal violations on the only remaining Summerville 230/115 kV transformer. Also, loss of the 230 kV #2 Bus at the Summerville Substation would cause the loss of service on two 230 kV lines (the St. George – Summerville 230 kV #2 Line and the Williams – Summerville 230 kV Line).

To relieve service outages on one 230/115 kV transformer at Summerville Substation, outages on two 230 kV lines and resulting heavy loading/overloading on other electrical equipment in the event of a loss of the Summerville 230 kV #2 Bus, SCE&G proposes to add the Pepperhill – Summerville 230 kV Line, Williams – Pepperhill Line Segment and associated facilities to its electrical transmission system in the southern region of its electrical service area. The addition of these two 230 kV lines will mitigate the N-1 contingency discussed above (effects of an outage on the Summerville Substation's 230 kV #2 Bus) and improve power flow in the southern region of SCE&G's service area.

1.4 The Proposed Action

SCE&G proposes to add two 230 kV lines and associated facilities to its electrical transmission system in the southern region of its electrical service area, which will include the following actions:

1. Construction of a new 230 kV circuit in existing SCE&G right-of-way, the Pepperhill - Summerville 230 kV Line, between SCE&G's Pepperhill and Summerville 230/115 kV Substations. The Line will be approximately 7.8 miles long and utilize bundled 1272 ("B-1272") ACSR conductor. Building this Line will be accomplished by replacing existing single-circuit H-Frame structures in the right-of-way that now support segments of the Williams – Summerville 230 kV Line and Williams – Canadys 230 kV Line with double-circuit 230 kV structures that will support the two segments of existing lines and the proposed Pepperhill – Summerville Line. The two existing 230 kV lines enter the right-of-way at a common point near Ancrum Road. At that right-of-way entry point, the Williams – Summerville Line runs in a northwesterly direction to the Summerville Substation, and the Williams – Canadys Line runs in a southeasterly direction and bypasses the Pepperhill Substation along its route to the Canadys 230/115 kV Substation. Thus, the combined distance of these two line segments in the right-of-way spans the entire distance between the Pepperhill and Summerville Substations. The segments of the Williams – Summerville Line and Williams – Canadys Line within the right-of-way between the Pepperhill and Summerville Substations will be reconductored with B-1272 ACSR conductor at the time of structure replacement.

2. The addition of two new 230 kV line terminals (one at Pepperhill Substation and one at Summerville Substation).
3. Reterminating the existing Williams – Canadys 230 kV Line at the Pepperhill Substation, which will necessitate building a new segment of 230 kV line in existing right-of-way contiguous to the Pepperhill Substation property, approximately 1,000 feet in length, to reach the new termination position in the substation. When reterminated at the Pepperhill Substation, the Williams – Canadys Line will become the Williams – Pepperhill 230 kV Line, and the new 1,000 foot long segment of it is referred to as the Williams – Pepperhill Line Segment throughout this report.

To facilitate these proposed actions, additional modifications will be made at the Pepperhill Substation that include the following:

1. The existing Pepperhill – Faber Place 230 kV Line will be disconnected from its 230 kV terminal at Pepperhill Substation and reconnected to the Canadys 230/115 kV Substation. The line name will be changed to the Canadys – Faber Place 230 kV Line (the existing segment of the Williams – Canadys 230 kV Line between the Canadys and Pepperhill Substations will become a part of the Canadys – Faber Place Line).
2. The Goose Creek – Pepperhill 230 kV Line, which is terminated at the Pepperhill Substation, will be reterminated onto the Pepperhill 230 kV line terminal vacated by the Pepperhill – Faber Place 230 kV Line.
3. The 230 kV line terminal vacated by the Goose Creek – Pepperhill 230 kV Line will be upgraded to accommodate B-1272 conductor and used to terminate the Williams – Canadys 230 kV Line (via the Williams – Pepperhill Line Segment) at the Pepperhill Substation. When terminated at Pepperhill, this line will become the Williams – Pepperhill 230 kV Line.

The addition of the Pepperhill – Summerville 230 kV Line and associated facilities, Williams – Pepperhill Line Segment and modifications at the Pepperhill Substation will improve power flow and 230 kV switching capability in the greater Charleston region in addition to relieving heavy loading/overloading occurrence in the event of a loss of the Summerville 230 kV #2 Bus.

Figure 1.4-1 shows the existing configuration of 230 kV line circuits connected to, and in the immediate vicinity of, the Pepperhill Substation. Figure 1.4-2 displays the configuration of 230 kV circuits following the addition of the Pepperhill – Summerville 230 kV Line and associated facilities, Williams – Pepperhill Line Segment and proposed 230 kV terminal modifications at the Pepperhill Substation.

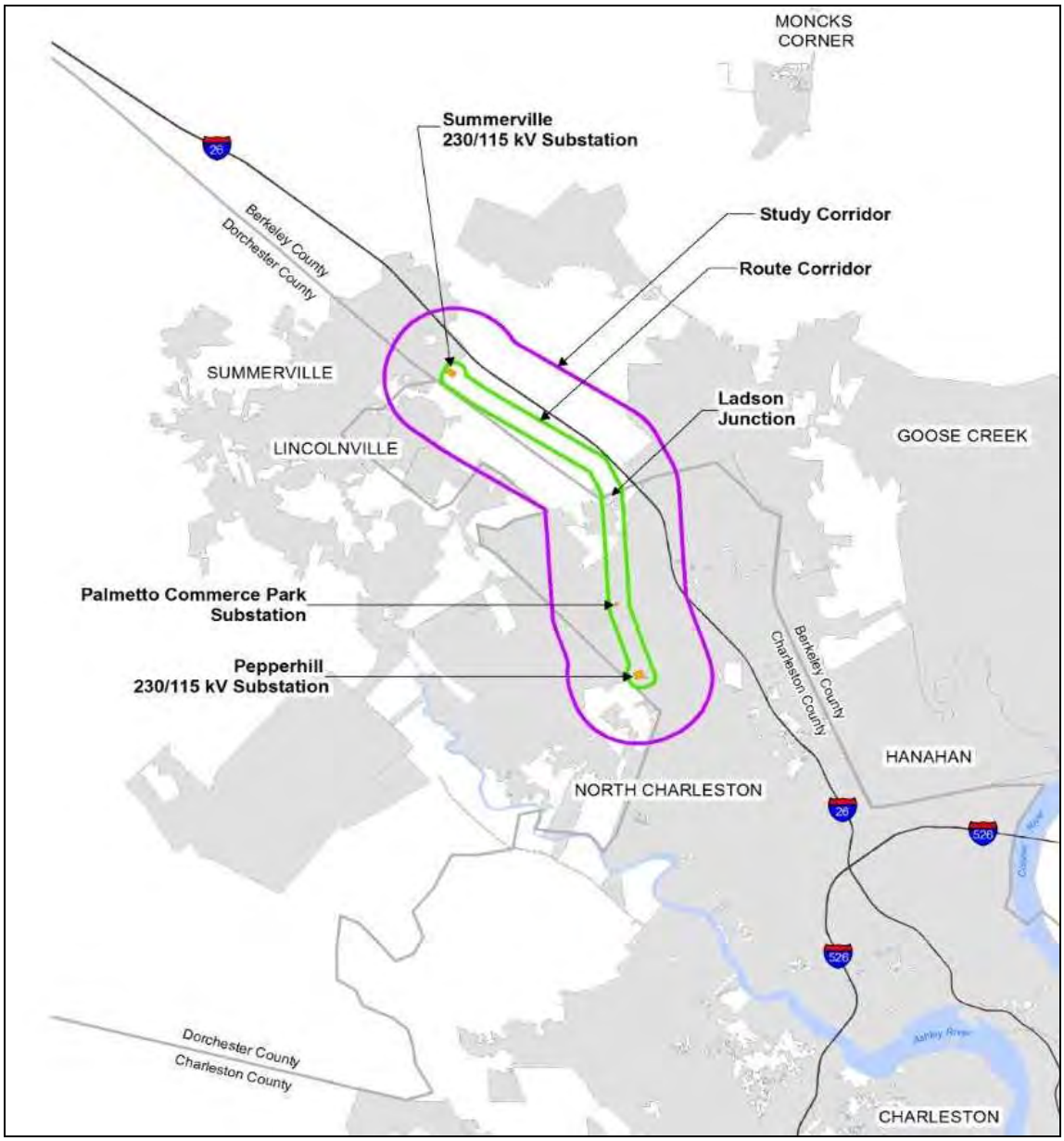
Figure 1.4-1: Existing Configuration of Pepperhill Substation and Associated 230 kV Lines

Figure 1.4-2: Proposed Configuration of Pepperhill Substation and Associated 230 kV Lines

The Pepperhill - Summerville 230 kV Line will be approximately 7.8 miles long, utilize B-1272 ACSR conductor, and reside in existing SCE&G right-of-way[2] in Berkeley and Charleston Counties that runs between the Pepperhill and Summerville 230/115 kV Substations.

The Williams - Pepperhill Line Segment will be approximately 1,000 feet long, utilize B-1272 ACSR conductor, and reside in existing SCE&G right-of-way in Charleston County (Figure 1.4-3).

Figure 1.4-3: Project Location



Note: The "route corridor" represents a 2,000' wide linear corridor (1,000' on each side of the proposed Lines) within which various data presented in this report were collected. The "study corridor" represents a 2.5 miles-wide linear corridor (1.25 miles-wide on each side of the proposed Lines) within which certain cultural resource data were collected.

[2] Where the Pepperhill – Summerville Line turns and runs on the north and west sides of the Pepperhill Substation as shown in Figure 1-4.2, it will be entirely on property owned by SCE&G rather than within a right-of-way easement area.

The addition of the Pepperhill - Summerville 230 kV Line, the Williams - Pepperhill Line Segment and proposed modifications to the 230 kV Line connections at the Pepperhill Substation will ensure compliance with NERC Transmission Planning Standards and SCE&G'S Long Range Planning Criteria.

2.0 Alternate Transmission Line Routes Considered

2.1 Utilization of Existing SCE&G Right-of-Way

SCE&G determined that the Pepperhill - Summerville 230 kV Line and the proposed Williams - Pepperhill Line Segment can be built entirely within existing SCE&G right-of-way. Currently, the existing right-of-way between the Pepperhill and Summerville 230/115 kV Substations is occupied by multiple 115 kV and 230 kV lines, including the Pepperhill - Summerville 115 kV Lines No. 1 and No. 2 that runs the entire distance between the Pepperhill and Summerville Substations. Also present in the right-of-way at various locations are segments of the Summerville - Ladson 115 kV Line, Williams - Summerville 230 kV Line, and Williams - Canadys 230 kV Line.[3]

The Williams - Summerville 230 kV Line and Williams - Canadys 230 kV Line originate at the Williams Generating Station Switchyard and run in a generally westerly direction in a common right-of-way for approximately 10.2 miles to a right-of-way intersection point with the right-of-way that runs between the Pepperhill and Summerville Substations. At this intersection point, which is just south of Ancrum Road, the Williams – Summerville Line turns and runs in a northwesterly direction for approximately 4 miles to the Summerville Substation. The Williams – Canadys Line turns at the right-of-way intersection point and runs in a southeasterly direction for approximately 3.8 miles where it turns, bypasses the Pepperhill Substation and continues to the Canadys Geneating Station. The combined length of the two existing 230 kV line segments in the right-of-way spans the entire distance between the Pepperhill and Summerville Substations.

Building the proposed Pepperhill - Summerville 230 kV Line within the existing right-of-way will require replacing the existing single-circuit 230 kV H-Frame structures now supporting segments of the Williams - Summerville and Williams - Canadys 230 kV Lines with SCE&G's standard double-circuit 230 kV structures (see Chapter 3). Removing the existing 230 kV H-Frame structures and replacing them with double-circuit 230 kV structures will allow the segments of the two existing 230 kV lines to share common structures with the new Pepperhill - Summerville 230 kV Line for their respective partial distances between the Pepperhill and Summerville Substations.

Utilization of existing right-of-way for new transmission lines provides many significant benefits when compared to new "greenfield" line routes including, but not limited to, the following:

1. Avoids additional utility easement severances of private property parcels;

[3] Configuration of existing lines in the right-of-way within which the Pepperhill - Summerville Line and Williams - Pepperhill Line Segment will be built is shown in Chapter 3, Figures 3.3-1, 3.3-2, 3.3-3, 3.3-4 and 3.3-5.

2. Increases the utilization of existing SCE&G transmission line right-of-way assets;
3. Consolidates multiple transmission lines into a single corridor;
4. Significantly minimizes potential for environmental, land use, cultural resource and scenic impacts;
5. Eliminates cost associated with acquisition of new right-of-way;
6. Minimizes long-term right-of-way maintenance costs;
7. Increases service reliability by significantly reducing or eliminating the potential for line damage due to trees falling into the right-of-way from adjacent forested areas on at least one side of the proposed line or lines;
8. Significantly reduces right-of-way preparation cost (to the point of virtual elimination in many cases); and,
9. Minimizes construction schedule durations.

Because an existing, cleared SCE&G right-of-way presently occupied by multiple transmission lines can be utilized for the Pepperhill - Summerville 230 kV Line and the Williams - Pepperhill Line Segment, SCE&G did not consider alternate transmission line routes. Any alternate “greenfield” route requiring the acquisition of new right-of-way would increase project cost, increase project duration, pose greater potential for adverse environmental effects, significantly increase land use impacts, and increase the potential for adverse effects to cultural and scenic resources in the area. For these reasons, SCE&G concluded it would not be justifiable to conduct a line route siting study and select a new “greenfield” route for the Pepperhill - Summerville Line or the Williams - Pepperhill Line Segment rather than utilizing its existing right-of-way. Rather, SCE&G investigated the existing right-of-way, including expansive areas surrounding it, to identify and quantify any likely direct and indirect effects to resources of South Carolina (environmental resources, land use, cultural resources and scenic resources) that could potentially result from construction of the Pepperhill - Summerville Line and the Williams - Pepperhill Line Segment. Included in Chapter 5 of this report is a complete summary of the findings of various investigations and studies SCE&G conducted along the existing right-of-way within which the new Lines will be located.

3.0 Description of the Pepperhill - Summerville 230 kV Line and the Williams - Pepperhill Line Segment

3.1 Pepperhill - Summerville 230 kV Line Structures

To accommodate combining segments of two existing 230 kV lines[4] running between the Pepperhill and Summerville Substations with the new 230 kV line, the Pepperhill - Summerville Line will utilize SCE&G's standard double-circuit 230 kV line tangent and angle structures. The tangent structures consist of single shaft, tubular steel or concrete poles[5] with 230 kV braced-post insulators (back to back insulator configuration on double-circuit structures). These structures provide construction efficiency and reliability. They have a clean, simple profile that provides aesthetic benefits; the compact design of the braced-post insulator assemblies allows efficient use of right-of-way space; and they are proven to be economical over their serviceable life when compared with other possible structure types. The Pepperhill - Summerville 230 kV Line will utilize B-1272 ACSR conductor over its approximate 7.8 mile length.

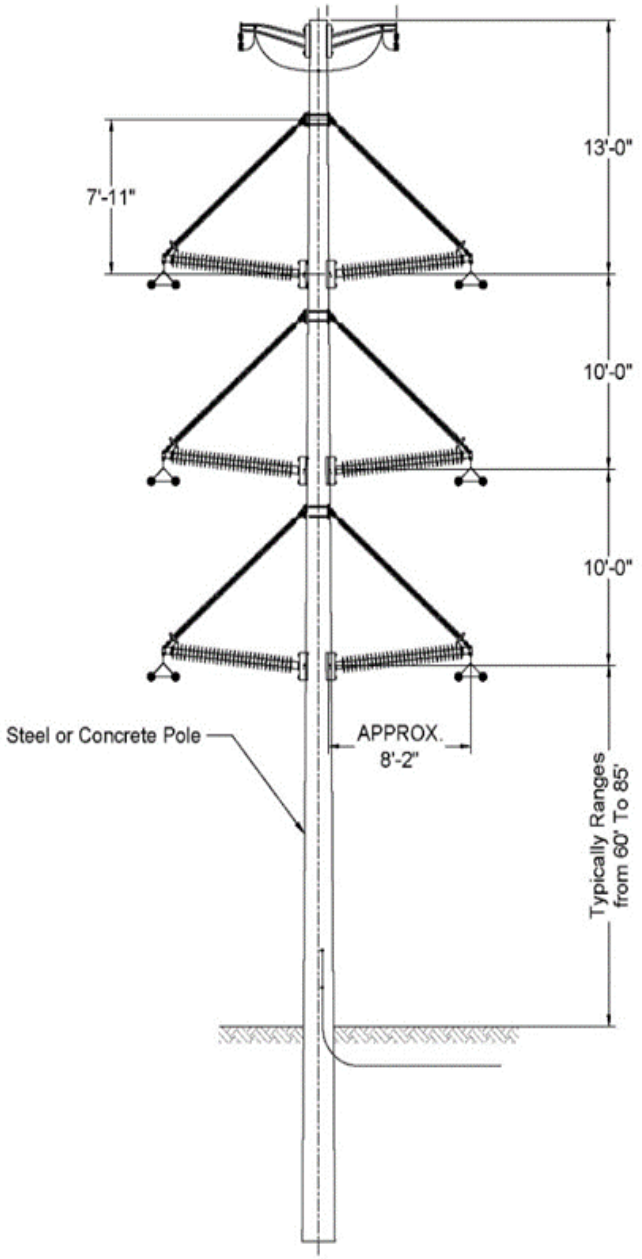
Although the Pepperhill - Summerville Line will consist of a single 230 kV circuit, the double-circuit structures are necessary to allow removal of segments of two existing single-circuit 230 kV lines in the existing right-of-way, each on H-Frame structures, and the relocation of those existing circuits onto the new double-circuit structures on which the Pepperhill - Summerville 230 kV Line will be located. At present, the right-of-way within which the Pepperhill - Summerville 230 kV Line will be constructed is fully occupied by the Pepperhill - Summerville 115 kV Lines No. 1 and No. 2, which runs the entire distance between the Pepperhill and Summerville 230/115 kV Substations and, at various locations, segments of the Williams - Summerville 230 kV Line, Summerville - Ladson 115 kV Line and Canadys - Williams 230 kV Line. Segments of the Williams - Summerville and Williams - Canadys 230 kV Lines will be relocated onto the new double-circuit structures and the existing H-Frame structures will be removed to provide room in the right-of-way for the addition of the Pepperhill - Summerville 230 kV Line circuit.

Figure 3.1-1 illustrates SCE&G's standard double-circuit 230 kV tangent structure.

[4] From the Summerville Substation, the Pepperhill – Summerville Line will share double-circuit structures with the Williams – Summerville 230 kV Line to a point approximately 400' south of Ancrum Road. From this point to the Pepperhill Substation, the Pepperhill – Summerville Line will share double-circuit structures with the Williams – Canadys 230 kV Line, which will become the Williams – Pepperhill 230 kV Line when terminated at the Pepperhill Substation.

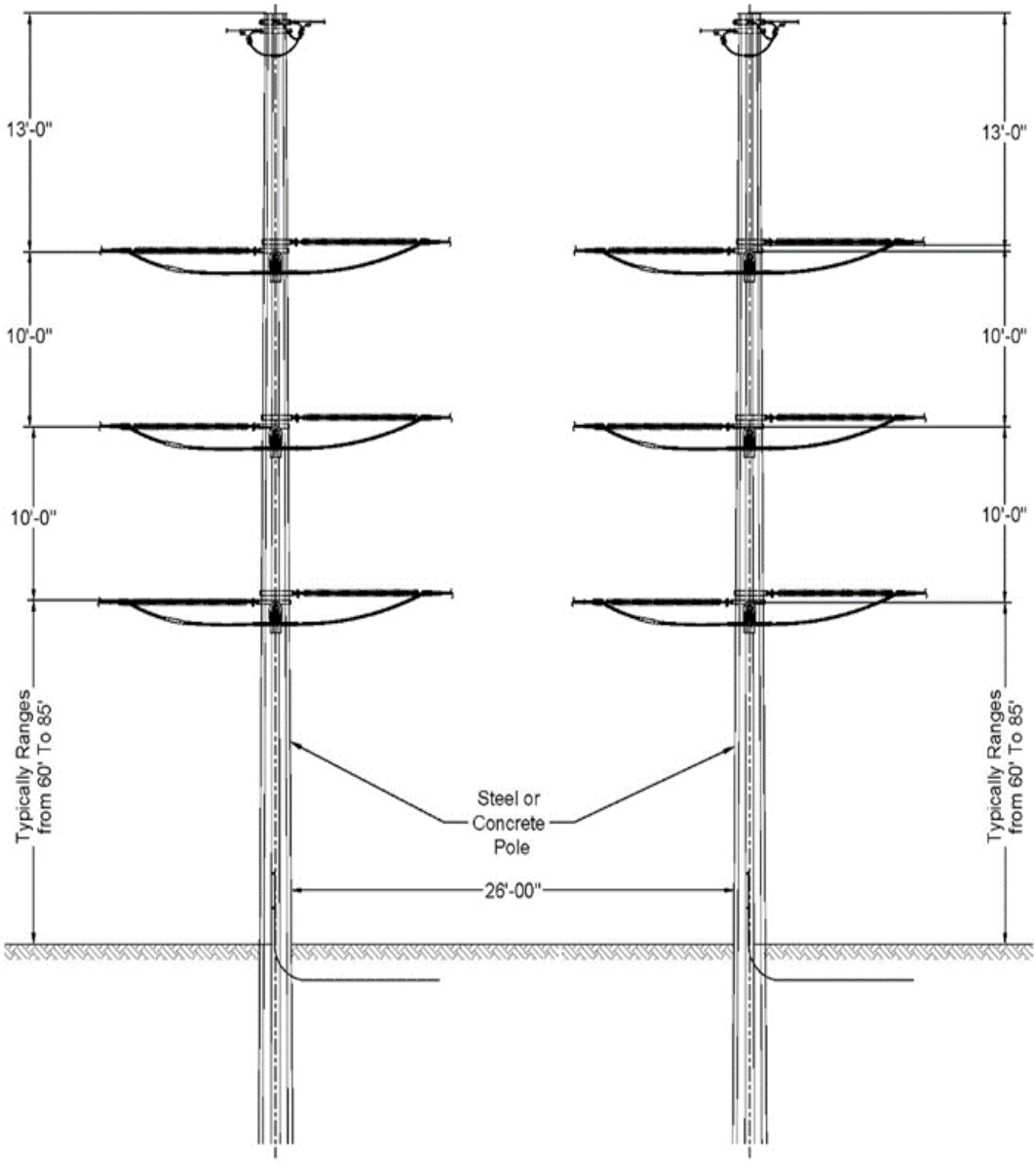
[5] Although tubular steel poles will likely be used for tangent and angle structures on the Pepperhill - Summerville 230 kV Line, similarly sized cylindrical concrete poles are occasionally used by SCE&G.

Figure 3.1-1 Standard SCE&G Double-Circuit 230 kV Tangent Structure Configuration
(not to scale)



Pepperhill - Summerville 230 kV Line angle structures will be SCE&G's standard two-pole, dead-end angle structures or two-pole, swinging angle structures. Each type consists of two single shaft, tubular steel or concrete poles, and each pole supports one circuit at the line angle point. Figure 3.1-2 illustrates SCE&G's standard dead-end angle structure, which has a profile similar to SCE&G's standard swinging angle structure (differing, primarily, in the configuration of insulators).

Figure 3.1-2 Standard SCE&G Double-Circuit Dead-End Angle Structure Configuration
(not to scale)

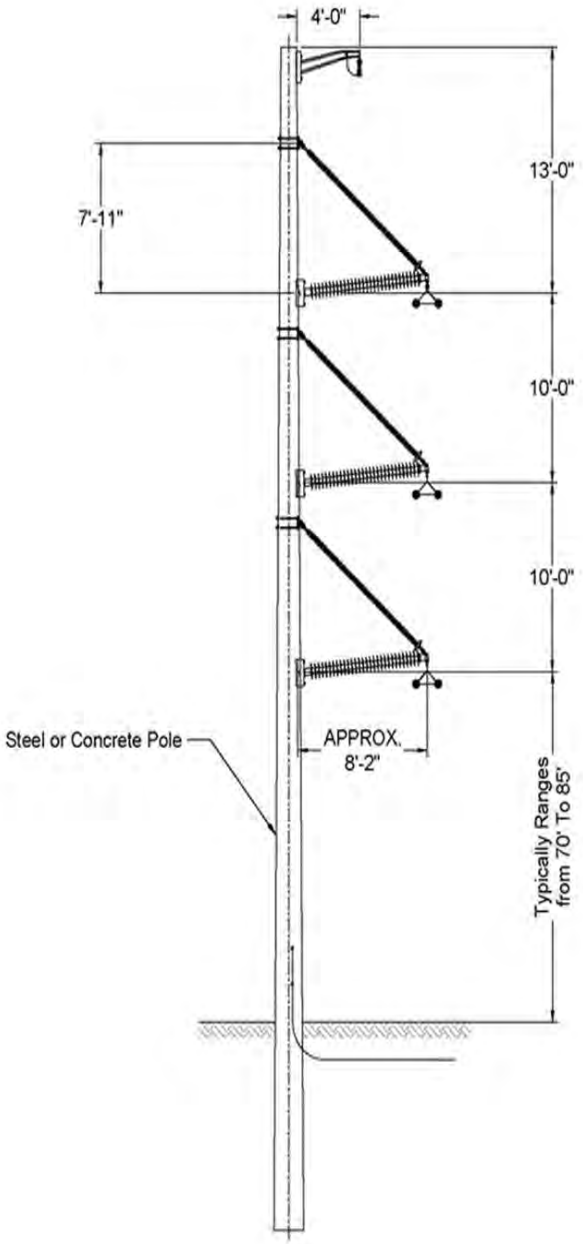


3.2 Williams - Pepperhill Line Segment Structures

The Williams - Pepperhill Line Segment will utilize SCE&G's standard single-circuit 230 kV line tangent and angle structures. The tangent structures consist of single shaft, tubular steel or concrete poles[6] with 230 kV braced-post insulators. The Williams - Pepperhill Line Segment will utilize B-1272 ACSR conductor over its approximate 1,000 feet length. Figure 3.2-1 illustrates SCE&G's standard single-circuit 230 kV tangent structure.

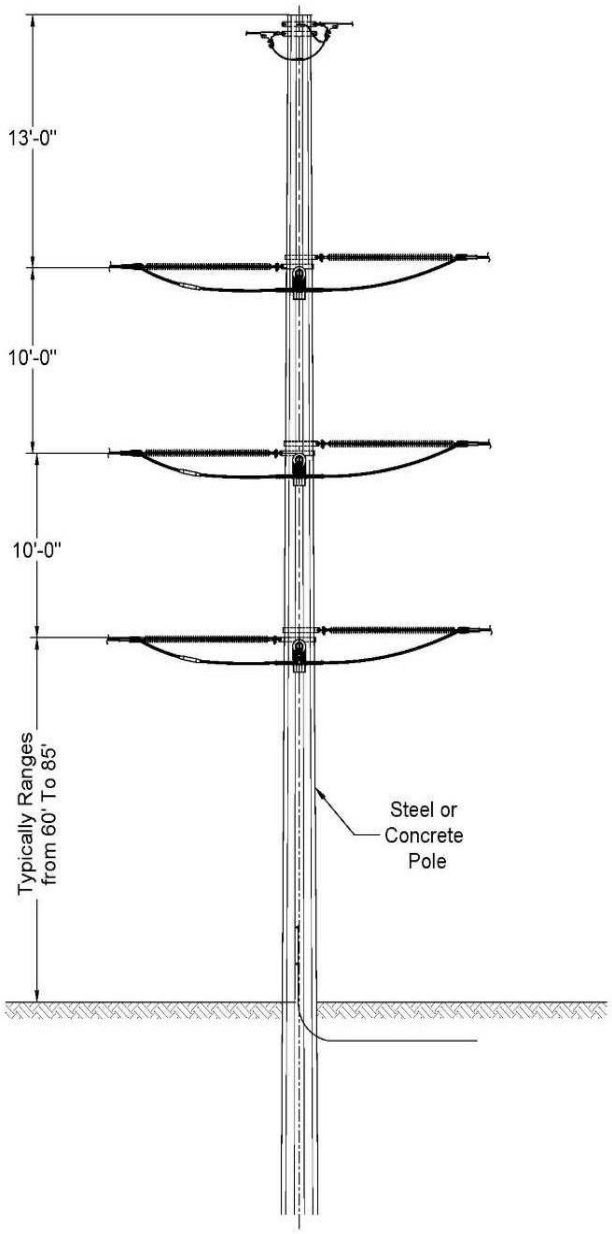
[6] Although tubular steel poles will likely be used for tangent and angle structures on the Williams - Pepperhill Line Segment, similarly sized cylindrical concrete poles are occasionally used by SCE&G.

Figure 3.2-1 Standard SCE&G Single-Circuit 230 kV Tangent Structure Configuration
(not to scale)



Angle structures utilized on the Williams - Pepperhill Line Segment will be SCE&G's standard single-pole, dead-end angle structure or single-pole, swinging angle structure. Each type consists of a single shaft, tubular steel or concrete pole that supports a single-circuit line at the angle point. Figure 3.2-2 illustrates SCE&G's standard dead-end, single-circuit angle structure, which has a profile similar to SCE&G's standard swinging angle structure (differing, primarily, in the configuration of insulators).

Figure 3.2-2 Standard SCE&G Single-Circuit Dead-End Angle Structure Configuration
(not to scale)



The height of the double-circuit structures utilized on the Pepperhill - Summerville 230 kV Line and single-circuit structures utilized on the Williams - Pepperhill Line Segment will typically range from 100 to120-feet; however, exceptions to the typical height range may be necessary to cross over existing utility lines and where the Lines will connect to the Pepperhill 230/115 kV Substation. Based on preliminary engineering, it is projected that the tallest structure height will be approximately 135-feet and that a structure approximately 60-feet in height will be required at the Pepperhill Substation. Structure spacing will typically range from 400 to 700-feet.

3.3 Description of Existing Right-of-Way Modifications Required to Add the Proposed Lines

Figure 3.3-1, following, shows various segments of the existing right-of-way within which the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will be constructed (a previous figure in this report, Figure 1.4-2, shows an enlarged view of the Williams - Pepperhill Line Segment's location). Segments 1, 2 and 3, shown on Figure 3.3-1, represent the Pepperhill - Summerville Line, and the Williams - Pepperhill Line Segment is represented by Segment 4. Within each segment where the Pepperhill - Summerville Line will be constructed, specific modifications to the existing 230 kV lines will be necessary to accommodate the Line, and Figures 3.3-2, 3.3-3 and 3.3-4 are cross-sectional views that illustrate the required modifications. No modifications of existing transmission lines will be required to accommodate the Williams - Pepperhill Line Segment in the existing right-of-way, and Figure 3.3-5 is a cross-sectional view of that line. All cross-sectional views were developed looking south along the existing right-of-way, and dimensions shown on them are preliminary and may vary slightly after design details are finalized.

Figure 3.3-1 Route Line Segment Locations of the Pepperhill - Summerville Line and Williams - Pepperhill Line Segment

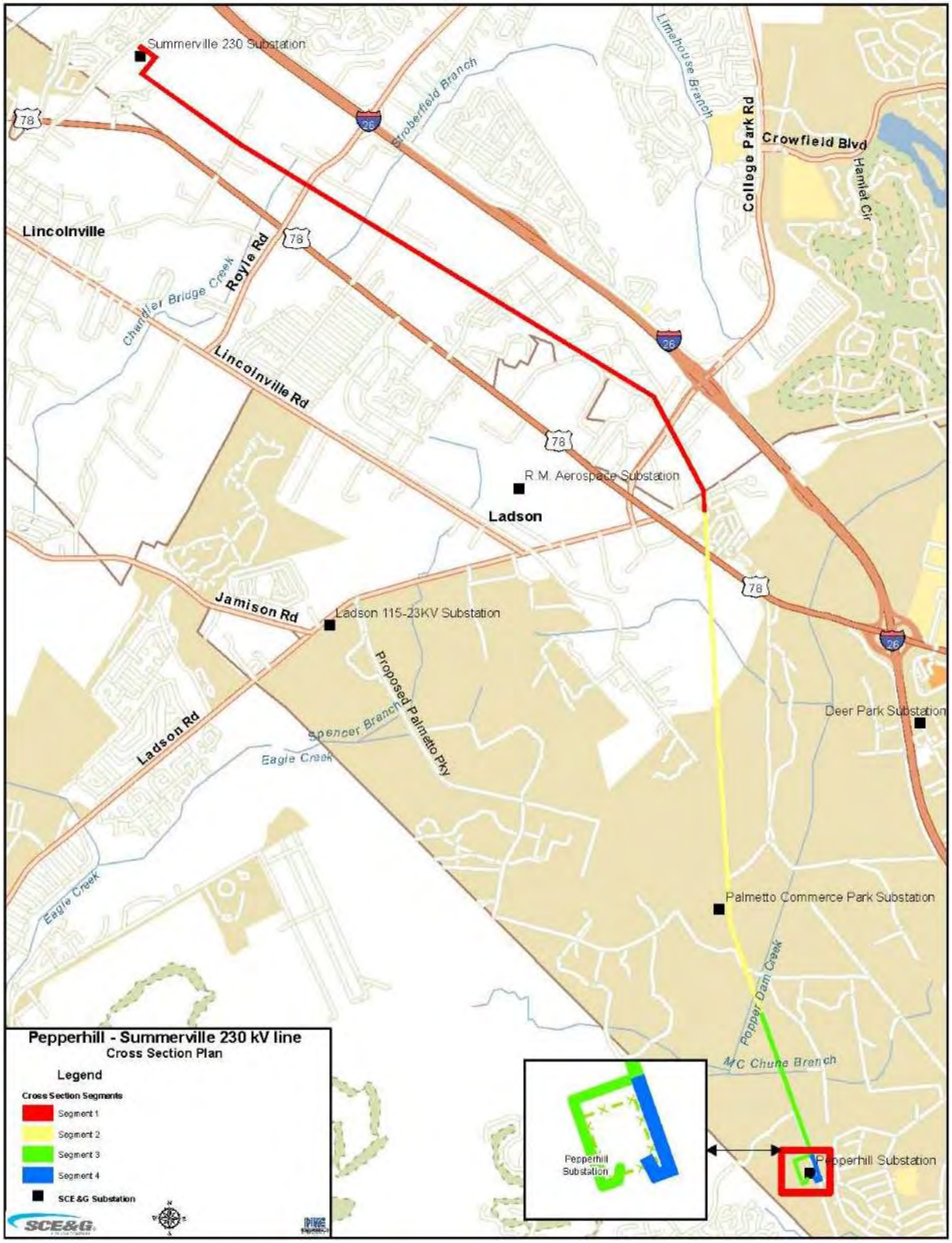


Figure 3.3-2 Segment 1 Cross-Section *(looking south)*

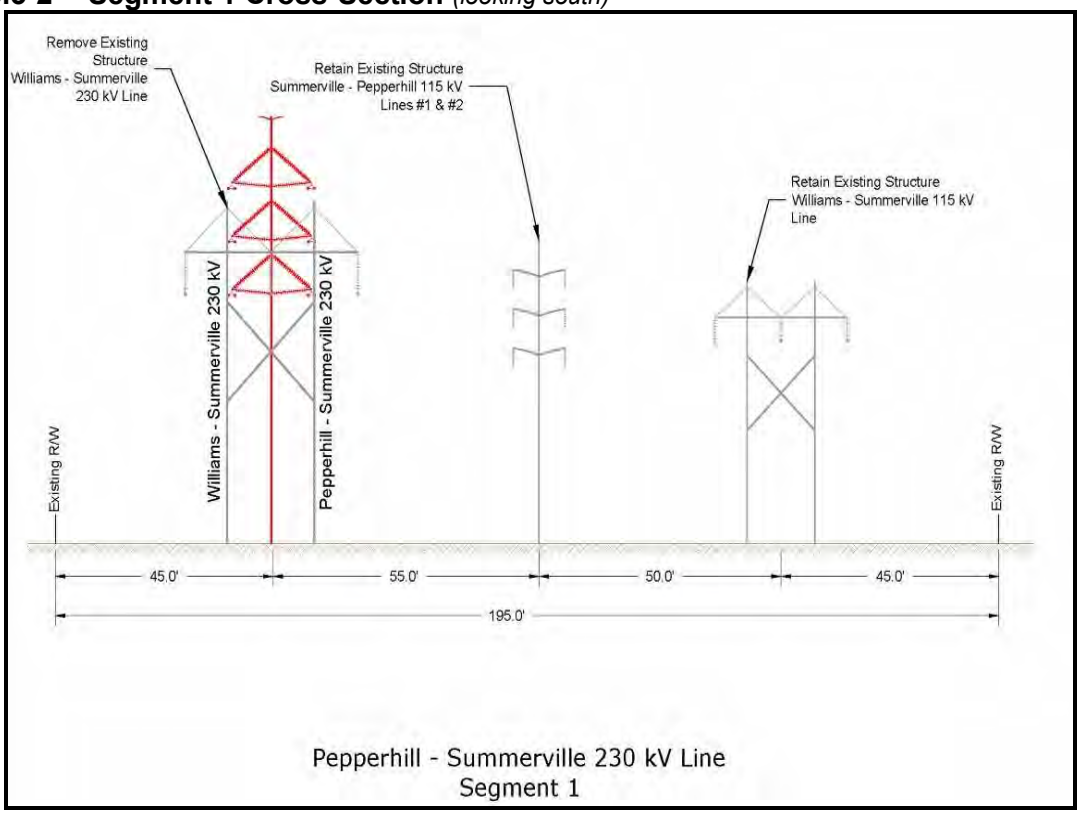
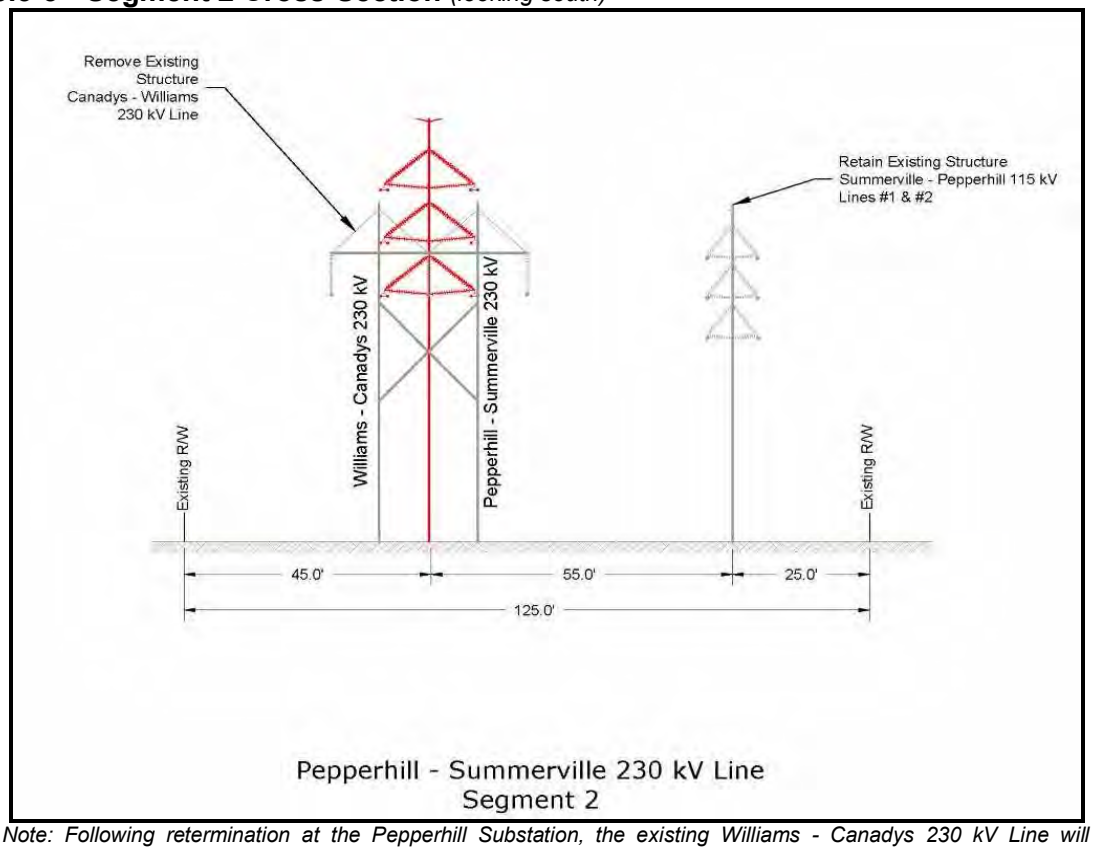
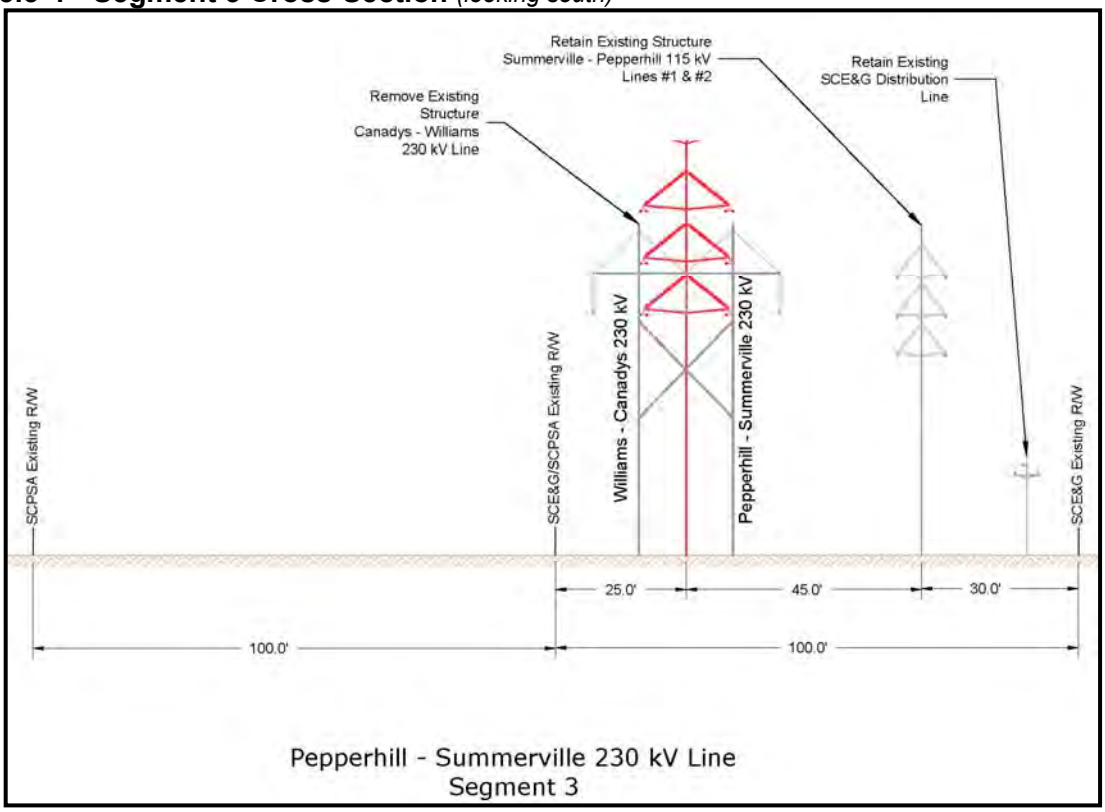


Figure 3.3-3 Segment 2 Cross-Section *(looking south)*



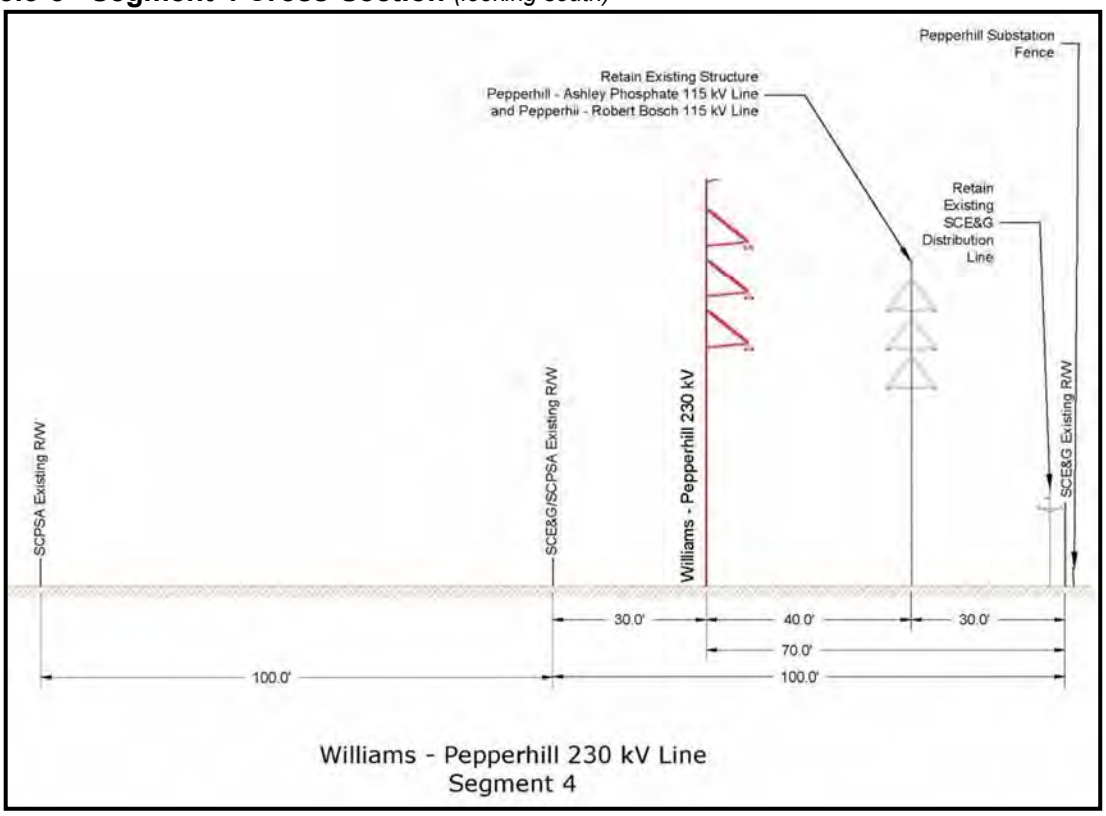
Note: Following retermination at the Pepperhill Substation, the existing Williams - Canadys 230 kV Line will become the Williams - Pepperhill 230 kV Line.

Figure 3.3-4 Segment 3 Cross-Section *(looking south)*



Note: Following retermination at the Pepperhill Substation, the existing Williams - Canadys 230 kV Line will become the Williams - Pepperhill 230 kV Line.

Figure 3.3-5 Segment 4 Cross-Section *(looking south)*



3.4 Road and Railroad Crossings

The Pepperhill - Summerville 230 kV Line route crosses eleven public roads and one railroad, which are identified in Chart 3.4-1. The Williams - Pepperhill Line Segment will cross no roads or railroads.

Chart 3.4-1 Pepperhill - Summerville 230 kV Line Road/Railroad Crossings

Road Crossed	Location of Crossing (County)	Approximate Distance Along the Line Route From the Summerville 230/115 kV Substation (Miles)
Bell Wright Road	Berkeley	0.65
State Road S-8-535	Berkeley	1.10
Limehouse Lane	Berkeley	1.60
Wisteria Street	Berkeley	2.25
Market Road	Berkeley	3.30
College Park Road (State Road S-8-62)	Berkeley	3.40
Wimberly Drive (at its intersection with Seabrook Drive)	Berkeley	3.50
Ancrum Road	Charleston	3.85
U.S. Highway 78	Charleston	4.10
Railroad	Charleston	5.35
Palmetto Commerce Parkway	Charleston	5.65
Terminates at the Pepperhill 230/115 kV Substation	Charleston	7.80

Design and construction of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will meet or exceed all applicable requirements of the National Electrical Safety Code that are current when the Lines are designed.

4.0 THE AFFECTED ENVIRONMENT

Note: Certain figures referenced in this chapter (4.0-A and 4.0-B) are included in this report under the "Figures" tab.

SCE&G compiled information on the affected environment by reviewing the published literature, interpreting aerial photography and satellite imagery, reviewing South Carolina governmental agency information, and performing field investigations. This chapter describes the general characteristics of the physiographic provinces within which the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will be located and provides specific information about environmental, land use, cultural and scenic resources in the immediate vicinity of the project. A Geographic Information System ("GIS") was used to analyze, model, and manage data for an area that extended outward 1.25 miles in each direction from the centerline of the proposed Lines for cultural resource data collection. Other data were compiled for the area extending outward 1,000-feet in each direction from the proposed Lines' centerline; selected additional data were compiled for the area within the existing right-of-way within which the proposed Lines will be located (*Figures 4.0-A and 4.0-B*). This data collection and mapping process allowed a qualitative and quantitative analysis of the likely effects to environmental, land use, cultural and scenic resources that will result from construction of the Pepperhill - Summerville Line and the Williams - Pepperhill Line Segment.

4.1 Land Use

The existing SCE&G right-of-way within which the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will be built has existed in its current condition (cleared with multiple transmission lines within it) for many decades, and existing land uses have been planned and implemented to accommodate the existing corridor. This section describes the existing land uses surrounding the existing right-of-way corridors within which the Lines will be located.

From the point of origination at the Summerville 230/115 kV Substation, the Pepperhill - Summerville 230 kV Line route (i.e., the existing SCE&G transmission line right-of-way) runs in a southeasterly direction for approximately 3.3 miles through various land uses consisting of multi-family residential, industrial, low density, single-family residential, commercial, manufactured home residential, and recreational land use associated with the Coastal Carolina Fairgrounds. This segment of the Line's route is generally parallel to and within ½ mile of Interstate Highway 26. At approximately 3.2 miles from the Summerville Substation, the Line's route turns and runs in a south-southeast direction for approximately 0.60 miles through a combination of single family and commercial land uses to a point where it turns and continues in a southerly direction for approximately 2.4 miles. Along the 2.4-mile segment, the Line's route passes through single family

residential, multi-family residential, and commercial land uses for a short distance. The majority of this segment of the Line's route (approximately 1.7-miles of the 2.4-mile segment) passes through undeveloped, forested areas. At the southern terminus of the 2.4-mile segment, the Line's route turns and continues in a south-southeast direction through an undeveloped area for slightly less than 1.5-miles to the Pepperhill 230/115 kV Substation.

The Williams - Pepperhill Line Segment begins at a point in the existing right-of-way just north of the Pepperhill Substation and runs for slightly less than 1,000 feet in the right-of-way to a point south of the substation where it turns west for a short distance and then north to connect with a 230 kV line terminal in the substation.

Existing land uses immediately surrounding the segment of existing SCE&G right-of-way within which the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will be built are represented by various figures in this report (*Figures 5.1-A, 5.1-B, 5.6-A*).

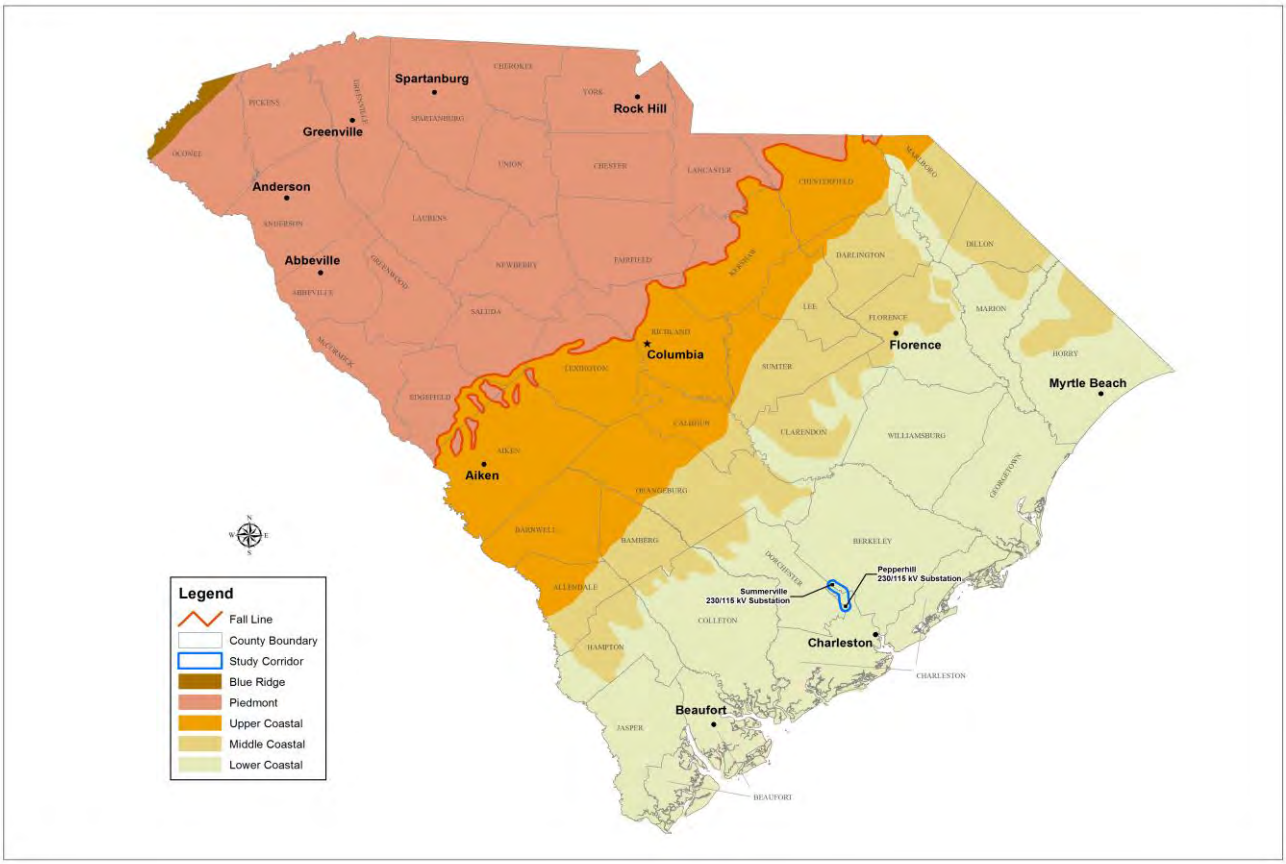
4.2 Physiography

South Carolina covers more than 32,020 square miles and is divided into three major physiographic provinces---Blue Ridge, Piedmont and Coastal Plain provinces. A small area along the northwestern boundary of the State lies in the Blue Ridge province. The Piedmont province occupies the area between the Blue Ridge province and the Coastal Plain physiographic province (the boundary separating the Piedmont/Coastal Plain provinces is known as the "Fall Line"). The area between the Fall Line and the Atlantic Ocean comprises the Coastal Plain province, which includes three (3) sub-regions: Upper Coastal, Middle Coastal, and Lower Coastal.

The Blue Ridge and Piedmont provinces are composed of igneous and metamorphic rocks, mostly gneiss, schist, phyllite, and slate. The Fall Line of South Carolina marks the contact of the Piedmont province with the Coastal Plain province. The Fall Line is a boundary of bedrock geology between the metamorphics of the Blue Ridge and Piedmont with the largely unconsolidated sediments of the coastal plain, but it can also be recognized from stream geomorphology. Falls or rapids are commonly present along the Fall Line and below the Fall Line they develop much broader flood plains. Elevations range from mean sea level ("M.S.L.") at the coast to 3,560 ft. above M.S.L. on Sassafras Mountain in the Blue Ridge province. Elevations along the Fall Line generally range from 275 ft. to 650 ft. above M.S.L.

The Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will reside entirely within the Lower Coastal sub-region of the Coastal Plain province, as illustrated in Figure 4.2-1.

Figure 4.2-1 South Carolina Physiographic Regions



4.3 Coastal Plain Physiographic Region Land Cover

Eight major land cover classifications are defined for the coastal plain, of which six are either unique to the province or reach their greatest extent there. The predominant habitat types that comprise the coastal plain are 1) grassland and early successional habitats, 2) pine woodland, and 3) river bottoms. Although the remaining types are less extensive, they provide habitat diversity that is important to a number of animals, especially wetland-dwelling species. Included below are descriptions of the major land cover classifications in the Coastal Plain physiographic province and the fauna that are common to the habitat provided by the classifications.

Pine Woodland

This classification is used to describe all pine-dominated forests throughout the province, including those occupying a variety of soil moisture characteristics except floodplains. The canopy is dominated by one or several species of pine, generally loblolly pine (*Pinus taeda*), or longleaf (*Pinus palustris*), depending on elevation, soil type and silvicultural history. Dense shrub thickets of hollies (*Ilex* spp.) and wax myrtle (*Morella cerifera*) may be present. Higher elevation pine woodlands have abundant grasses and herbaceous cover, particularly when burning is frequent. Optimal habitat for

priority species consists of open stands of longleaf pine, sparse understory and shrub layers, a ground cover of wiregrass (*Aristida* spp.), and diverse herbaceous species. Wet prairie, grass-sedge bog, herb bog or pitcher plant bog, is typically found in the outer coastal plain on flat sites with a high water table and soil that is saturated for at least part of the year. Vegetation consists of a thin canopy of pines, almost always longleaf (*Pinus palustris*), although loblolly and pond pine (*P. serotina*) may also be present. The understory is essentially absent or very scattered. Herbaceous flora is quite rich, consisting of many grasses and sedges. Pine flatwoods intergrades with pine savanna; like pine savanna, it is pine woodland situated on essentially flat or rolling terrain with sandy soil and a high water table. Unlike pine savanna, pine flatwoods feature a well-developed sub-canopy of several tall shrub species. Pine flatwoods are the principal forest type for much of the lower coastal plain.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	American Kestrel, Bachman's Sparrow, Brown-headed Nuthatch, Henslow's Sparrow, Northern Bobwhite, Red-cockaded Woodpecker, Black Bear, Northern Yellow Bat
High Priority	Eastern Diamondback Rattlesnake, Mimic Glass Lizard, Pine Woods Snake
Moderate Priority	Slender Glass Lizard, Eastern Fox Squirrel, Eastern Woodrat

Sandhill Pine Woodland

Sandhill pine woodland is a variation of pine woodland composed of species adapted to xeric, sandy soils. The type occurs principally in the sandhills but also on sand ridges in the coastal plain. Absent frequent fire, a canopy of longleaf pine and a sub-canopy of turkey oak prevail, interspersed with scrub oak species and scrub/shrub cover. Frequent burning leads to development of longleaf pine-wiregrass communities.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	American Kestrel, Bachman's Sparrow, Brown-headed Nuthatch, Eastern Wood Pewee, Northern Bobwhite, Red-cockaded Woodpecker, Wood Thrush, Coral Snake, Gopher Tortoise, Pine Snake, Southern Hognose Snake
High Priority	Pine Woods Snake
Moderate Priority	Eastern Woodrat, Eastern Fox Squirrel

Upland Forest

Vegetation composition of upland forest is similar to that of oak-hickory forest in the Piedmont, where it is a major vegetation type. Upland forest is rare in the coastal plain, typically occurring on fire-suppressed upland slopes near river floodplains or between rivers and tributaries. It intergrades with river slope communities. Representative canopy trees include white oak (*Quercus alba*), black oak (*Quercus velutina*), post oak (*Quercus stellata*), mockernut hickory (*Carya tomentosa*), pignut hickory (*Carya glabra*), loblolly pine (*Pinus taeda*), flowering dogwood (*Cornus florida*), and black gum (*Nyssa sylvatica*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Eastern Wood Pewee, Kentucky Warbler, Rusty Blackbird, Swainson's Warbler, Swallow-tailed Kite, Wood Thrush, Worm-eating Warbler, Chamberlain's Dwarf Salamander, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, Bald Eagle, Southeastern Bat, Star-nosed Mole
Moderate Priority	Louisiana Waterthrush, Eastern Woodrat, Eastern Fox Squirrel, Southern Dusky Salamander

Grassland and Early Successional Habitats

A variety of open-land habitats occupy a considerable portion of upland sites in the Piedmont, sandhills and coastal plain, including agricultural land, recently abandoned farmland, recently cleared land, and a matrix of managed open pine forest and grassland. Golf courses, urban yards and open spaces are also included in this habitat type. Vegetation on most sites consist of pine woodland and oak-hickory forest, although many sites are maintained in early successional stages. Agricultural lands with surrounding forest edge habitat occur widely throughout the province and represent the prevailing cover type in the "agriculture belt" that composes most of the inner coastal plain.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Common Ground-Dove, Eastern Meadowlark, Field Sparrow, Grasshopper Sparrow, Loggerhead Shrike, Northern Bobwhite, Painted Bunting
High Priority	Barn Owl
Moderate Priority	American Woodcock, Bewick's Wren, Meadow Vole, Eastern Woodrat

Ponds and Depressions

Topographic depressions in the coastal plain support a variety of permanently and semi-permanently flooded isolated freshwater wetlands that have open or closed canopy forest cover. Vegetation cover varies with hydrology, substrate and fire frequency. Depression meadows, pond cypress ponds, swamp tupelo ponds, pocosins and limestone sinks are also included in this habitat type. Landforms include natural and artificial ponds dominated by cypress and/or swamp tupelo, limestone sinks, and Carolina bays. Shrub-dominated pocosins or grass-sedge-herb dominated depression meadows occur on peat- or clay-based substrates, typically in Carolina bays. Absent fire, vegetation in most of these habitats reverts to mixed floodplain hardwood and cypress-tupelo dominated forest. Upslope from these lowland habitats, the transition to well drained uplands supporting pine woodland is often abrupt.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Little Blue Heron, Yellow-crowned Night-Heron, Flatwoods Salamander, Tiger Salamander, Carolina Gopher Frog, Broad-striped Dwarf Siren, Chamberlain's Dwarf Salamander
High Priority	Black Swamp Snake, Chicken Turtle, Florida Cooter, Florida Green Watersnake, Florida Softshell Turtle, Gulf Coast Mud Salamander, Yellowbelly Turtle, Upland Chorus Frog, Mink, Southeastern Bat
Moderate Priority	Great Blue Heron, Great Egret, Common Snapping Turtle, Spotted Turtle, Southern Dusky Salamander, Northern Cricket Frog

Hardwood Slopes and Stream Bottoms

A complex of hardwood and hardwood-pine communities occupies the floodplains of small streams, mesic bluffs and infrequently flooded flats in association with streams or rivers. Fire is infrequent, due either to the sheltered locations of these communities on bluffs or their isolation within a floodplain. Several mixed mesophytic subtypes characterized by the presence of American beech *(Fagus grandifolia)* occur in sheltered sites with moist soils, particularly on north-facing river bluffs and on slopes of drains and creeks. On upland flats within floodplains (hammocks), southern magnolia *(Magnolia grandiflora)* frequently shares dominance with American beech. The calcareous cliff and marl forest subtype occurs on circumneutral soils derived from limestone or unconsolidated calcareous substrates such as marl. Forest structure of all subtypes is diverse, with understory, shrub and herbaceous species varying according to soil moisture and chemistry. All subtypes intergrade with blackwater stream forest or river bottom forest on lowland sides and with upland forest on upland sides.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Black-throated Green Warbler, Eastern Wood Pewee, Kentucky Warbler, Rusty Blackbird, Swainson's Warbler, Swallow-tailed Kite, Wood Thrush, Worm-eating Warbler, Chamberlain's Dwarf Salamander, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, Bald Eagle, Southeastern Bat, Star-nosed Mole
Moderate Priority	Louisiana Waterthrush, Eastern Woodrat, Eastern Fox Squirrel, Southern Dusky Salamander

Blackwater Stream Systems

Tributary streams in the sandhills and coastal plain are commonly known as "blackwater streams" for the color of tannins leaching from decaying vegetation. Forests on the narrow floodplains formed by these streams typically have a canopy dominated by swamp tupelo *(Nyssa biflora)* and red maple *(Acer rubrum)*. On broader sites, bald cypress *(Taxodium distichum)* can become an important canopy species. Tulip poplar *(Liriodendron tulipifera)*, sweet gum *(Liquidambar styraciflua)*, pond pine *(Pinus serotina)*, loblolly pine *(Pinus taeda*), and laurel oak *(Quercus laurifolia)* are important associates. The shrub layer is open in areas subjected to the most flooding, or it can be fairly dense and pocosin-like in areas subject to infrequent flooding. Headwaters and wet

flats immediately above the floodplain can support dense, pocosin-like shrub thickets or, under suitable fire conditions, pure stands of Atlantic white cedar (*Chamaecyperus thyoides*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Kentucky Warbler, Eastern Wood Pewee, Rusty Blackbird, Swainson's Warbler, Wood Thrush, Yellow-crowned Night Heron
High Priority	Acadian Flycatcher, Black Swamp Snake, Spiny Softshell Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat
Moderate Priority	American Woodcock, Louisiana Waterthrush, Wood Duck, Spotted Turtle

River Bottoms

River bottoms, or "bottomland forests," consist of hardwood-dominated woodlands with moist soils that are usually associated with the broad floodplains of major rivers in the Piedmont or Blue Ridge. Locally, the floodplains of major coastal plain rivers are significant components of the landscape. Characteristic trees include sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), laurel oak (*Quercus laurifolia*), cherrybark oak (*Quercus pagoda*), and American holly (*Ilex opaca*). A subtype dominated by bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*) occurs on lower elevation sites interspersed and intergrading with oak-dominated woodlands. Dominant trees are bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*), swamp gum (*Nyssa biflora*), Carolina ash (*Fraxinus caroliniana*), water elm (*Planera aquatica*), and red maple (*Acer rubrum*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Black-throated Green Warbler, Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Swainson's Warbler, Yellow-crowned Night Heron, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, American Alligator, Black Swamp Snake, Gulf Coast Mud Salamander, River Cooter, Spiny Softshell Turtle, Striped Mud Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat, Star-nosed Mole
Moderate Priority	American Woodcock, Great Blue Heron, Great Egret, Louisiana Waterthrush, Wood Duck, Bird-voiced Treefrog, Common Snapping Turtle, Spotted Turtle, Eastern Woodrat, Eastern Fox Squirrel

Land cover types and quantities within 1,000 feet of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment are presented in Chart 4.3-1.

Chart 4.3-1 Land Cover Types and Quantities within 1,000 feet of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment

Land Cover Type	Acres
Barren	32.9
Bottomland/Floodplain/Hardwood Forest	20.3
Cropland	0.0
Grass / Pasture	276.2
Hardwood Forest	28.7
Mixed Hardwood / Pine Forest	859.8
Pine Forest	70.2
Scrub / Shrub	131.9
Urban / Built-up	436.0
Water	14.5
Wetland	64.2

The dominant land cover types found in the existing cleared right-of-way within which the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will be located is grass/pasture and scrub/shrub. These types are common in transmission line rights-of-way where maintenance practices are designed to preclude and/or control the presence of species that would interfere with the safe, reliable operation of transmission lines.

4.4 Surface Water Hydrology

The route for the Pepperhill - Summerville Line and Williams - Pepperhill Line Segment reside in the following two (2) major drainage basins:

- South Carolina Coastal - Ashley River (approximately 1.2 miles of the Lines' routes)
- Cooper River (approximately 6.8 miles of the Lines' routes)

The waters within the drainage basins that will be crossed by the Lines are shown in Chart 4.4-1.

Chart 4.4-1 Drainage Basins and Waters Crossed by the Pepperhill - Summerville Line and Williams - Pepperhill Line Segment

Drainage Basin	Waters Crossed by the Line
South Carolina Coastal - Ashley River	No streams crossed
Cooper River	McChune Branch
	Several unnamed tributaries and ditches

All waters crossed by the Pepperhill - Summerville 230 kV Line (none are crossed by the Williams - Pepperhill Line Segment) are classified by the South Carolina Department of Health and Environmental Control ("SCDHEC") as "freshwaters." SCDHEC defines freshwaters as *"suitable for primary and secondary contact recreation, a source for drinking water after conventional treatment in accordance with the requirements of SCDHEC, suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora, and suitable for industrial and*

agricultural uses." Stream water quality in the immediate vicinity of the line route is generally good, and there are few ponds in the vicinity of the line route.

Precipitation is the basic source of water resources in Berkeley and Charleston Counties, South Carolina. Years with significantly higher or lower than average precipitation are uncommon; however, droughts have occurred in the region in 1954-55**,** 1986, 1996, and 1998-2002. The historical average annual precipitation is 48.1 inches for Berkeley County and 49.5 inches for Charleston County. Annual precipitation is fairly well distributed throughout the region, with midsummer being the wettest, historically, and fall the driest. The period from April to September in South Carolina, which is the span of the growing season, receives an average of about 67 percent of the annual total precipitation (USDA 1980). Measurable snowfall occurs very infrequently in Berkeley and Charleston Counties.

In April 2012, Palmetto Environmental Consulting, Inc. ("PEC") conducted a jurisdictional waters/wetlands delineation in the right-of-way within which the Pepperhill - Summerville Line and Williams – Pepperhill Line Segment will be built. Also, PEC delineated waters/wetlands on the portions of the Pepperhill and Summerville 230/115 kV Substation properties the Lines will cross as they enter the substations. During the delineation, wetland boundaries were marked and surveyed using a Trimble GeoXT global positioning system unit. PEC prepared mapping that displays the boundaries of jurisdictional waters and wetlands (*Appendix B*). Approximately 54.4 acres of wetlands reside in the existing right-of-way and portions of substation properties within which the Line will be built; however, only 28.9 acres of the total acreage reside in the linear zone of the wider right-of-way where construction activities associated with the Line will occur. Approximately 295 linear feet of stream channels are present in the right-of-way that comprise approximately 0.1 acre; no streams are present on either of the Summerville or Pepperhill Substation properties.

SCE&G regularly maintains its transmission line rights-of-way to prevent vegetative growth that would interfere with the safe, reliable operation of transmission line; therefore, no forested wetlands are present in the existing right-of-way where the Lines will be located. Wetlands in the right-of-way south of U.S. Highway 78 are few but extensive and contiguous, while wetlands north of US Highway 78 are numerous but generally small. Wetland vegetation in the right-of-way consists predominantly of bushy bluestem (*Andropogon glomeratus*), plume grass (*Erianthus contortus*), dogfennel (*Eupatorium capillifolium*), giant cane (*Arundinaria gigantea*), cinnamon fern (*Osmunda cinnamomea*), netted chain fern (*Woodwardia areolata*), common rush *(Juncus effusus*), henbit (*Lamium amplexicaule*), common sheep sorrel (*Rumex acetosella*), geranium (*Geranium carolinianum*), and various sedges (*Carex* sp.) and grasses. Few vines were observed during the

field investigation; those observed consisted of muscadine (*Vitis rotudifolia*), roundleaf greenbrier (*Smilax rotundifolia*), and laurel greenbrier (*Smilax laurifolia*).

4.5 Wildlife

Land use and natural plant communities strongly influence the wildlife diversity of the vicinity within which the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will be located. The bottomland forests of the area offer habitat for white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), and wild turkey (*Meleagris gallopavo*). Other representative species in this area include the gray squirrel (*Sciurus carolinensis*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), prothonotary warbler (*Protonotaria citrea*), Carolina wren *(Thryothorus ludovicianus*), Carolina chickadee (*Poecile carolinensis*), red-shouldered hawk (*Buteo lineatus*), parula warbler (*Parula americana*), green frog (*Rana clamitans*), bird-voiced tree frog (*Hyla avivoca*), box turtle (*Terrapene carolina*), and black racer (*Coluber constrictor*).

The pine forests provide habitat that supports the eastern diamondback rattlesnake (*Crotalus adamanteus*), green anole (*Anolis carolinensis*), northern cardinal (*Cardinalis cardinalis*), bobwhite quail (*Colinus virginianus*), and eastern fox squirrel *(S. niger*). Other representative species found in the forested areas of the siting study area include the white-tailed deer, cottontail rabbit (*Sylvilagus floridanus*), wild turkey, red-tailed hawk (*Buteo jamaicensis*), pine warbler (*Dendroica pinus*), eastern towhee (*Pipilo erythrophthalmus*), pine snake (*Pituophis melanoleucus*), oak toad (*Bufo quercicus*), and flatwoods salamander (*Ambystoma cingulatum*).

Areas where most of the mature pine trees (i.e., loblolly and longleaf) have been recently removed now consist of scrub/shrub and regenerating hardwoods such as sapling swamp tupelo *(Nyssa biflora),* red maple *(Acer rubrum)*, tulip poplar *(Liriodendron tulipifera)*, sweet gum *(Liquidambar styraciflua)*, pond pine *(Pinus serotina)*, loblolly pine *(Pinus taeda*), and laurel oak *(Quercus laurifolia.* The representative species found in these areas include the eastern garter snake (*Thamnophis sirtalis*), rough green snake (*Opheodrys aestivus*), red-tailed hawk, Carolina wren, northern mockingbird (*Mimus polyglottos*), yellow-breasted chat (*Icteria virens*), eastern cottontail, golden mouse (*Peromyscus nuttalli*), and white-tailed deer.

4.6 Fisheries

Most of the area's perennial streams are typical of South Carolina's Coastal Plain freshwater streams where an abundance of finfish and mussels can be found. The waters of the region include the Ashley and Cooper Rivers and their associated tributaries. Species supported in these systems include largemouth bass (*Micropterus salmoides*), catfish (*Ictalurus* spp.) and several sunfish species (*Lepomis* spp.). Other waters in the area are represented by non-game species such as the

rosyside dace (*Clinostomus funduloides*), yellowfin shiner (*Notropis lutipinnis*), and the creek chub (*Semotilus atromaculatus*).

A limited number of small ponds in the region offer opportunities to fish for largemouth bass (*Micropterus salmoides*), sunfish (*Lepomis* spp.), and catfish (*Ictalurus* spp.).

4.7 Protected Species Literature and Records Search

PEC conducted a protected species literature and records search on April 2, 2012 and updated the search on April 19, 2018, to determine the presence of known occurrences of federally and state-listed animal and plant species on or within a one-mile of the right-of-way within which the Pepperhill - Summerville 230 kV Line will be located and on the Pepperhill 230/115 kV Substation property where land disturbance may result from substation expansion associated with the addition of the Line. The literature and records searches included review of the following resources:

- The USFWS South Carolina Distribution Records of Endangered, Threatened, Candidate and Species of Concern (updated May 2011);
- The South Carolina Department of Natural Resources' ("SCDNR") South Carolina Rare, Threatened, and Endangered Species Inventory database (updated January 17, 2006) for the Ladson, Summerville, and Mount Holly quadrangles; and,
- The SCDNR Heritage Trust Program's Rare, Threatened, and Endangered Species Database GIS layer [SC_StatewideEOs.lyr] (updated January 13, 2012).

The literature and records search revealed one known occurrence of least tern (*Sterna antillarum*), two occurrences of yellow fringeless orchid (*Platanthera integra*), one occurrence of green fringe orchid (*P. lacera*), one occurrence of crestless plume orchid (*Pteroglossapis ecristata*), and one occurrence of scarlet Indian-paintbrush (*Castilleja coccinea*) within one mile of the proposed Pepperhill - Summerville Line and Williams – Pepperhill Line Segment. All of these species are state-listed; none are federally-listed, and none are located in the existing right-of-way or portions of the substation properties the Lines will cross. One hundred twenty-two (122) species of federally- and state-listed plants and animals either occur or potentially occur in Berkeley and Charleston counties. These species, as well as the results of the literature and records search, are summarized in PEC's report entitled *"Federally-Listed Threatened and Endangered Species/State Rare, Threatened, and Endangered Species Assessment and Jurisdictional Waters/Wetlands Assessment (for the) Proposed Pepperhill - Summerville 230kV Line and Williams – Pepperhill Line Segment, Berkeley and Charleston Counties, South Carolina"* dated April 27, 2012, updated April 19, 2018 (*Appendix B*). Because of the large number of species listed in Berkeley and Charleston

Counties, PEC's report only addresses those species for which appropriate habitat is located within existing right-of-way and/or on the Pepperhill Substation property.

4.8 Cultural Resources

In April 2012 SCE&G engaged Brockington and Associates, Inc. ("Brockington"), a national cultural resources consulting firm headquartered in Norcross, Georgia, to conduct background research to determine previously recorded architectural resources within 1.25 miles of the Pepperhill - Summerville 230 kV Line route and archaeological resources within 0.5 miles. Brockington was engaged again in April 2018 to conduct background research for the purpose of confirming / updating the 2012 findings and to consider the Williams - Pepperhill Line Segment in the research (the Williams - Pepperhill Line Segment was not included in the 2012 research). The findings of the background research, current as of April 2018, are summarized below in two categories, archaeology and architecture.

Archaeology

Brockington conducted the archaeological site search for the area within 0.5 miles of the centerline of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment using Archsite, South Carolina's online cultural resources GIS database. The Archsite database provides information on cultural resources surveys as well as previously recorded archaeological sites. The archaeological site search revealed that forty-eight archaeological sites/resources have been documented within 0.5 miles of the centerline of the future Lines, three of which, according to the records, occur in the Lines' right-of-way. The forty-eight documented sites are summarized according to their National Register of Historic Places ("NRHP") status in Chart 4.8-1.

Chart 4.8-1: Recorded Archaeological Resources within 0.5 Miles of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment Routes

Archaeological Resource NRHP Status	Number of Archaeological Resources
Listed on the NRHP	0
Eligible for the NRHP / Contributes to an Eligible District	5
Potentially Eligible for the NRHP	13
Potentially Eligible Pending New Assessment of Not Eligible	6
Not Eligible/Probably Not Eligible for the NRHP	24
Total	**48**

The three archaeological sites that, according to the records, occur in in the Lines' right-of-way are identified as site numbers 38CH230, 38CH1014, and 38CH2159. Site 38CH230, associated with the Windsor Hill Plantation, was the site of General William Moultrie's grave. The site has been destroyed and all burials in the cemetery were removed and relocated in the 1970s. Site 38CH1014

has been disturbed/destroyed by grading and the deposition of fill materials. Elements of Site 38CH2159, an extensive inland rice paddy dike system located near the east end of McChune Branch, are still in existence within the Pepperhill - Summerville Line right-of-way.

In addition to the background research, SCE&G engaged Brockington to conduct comprehensive Phase I archaeological investigations within the Lines' right-of-way. The initial Phase I Survey was conducted in May and July 2014 along the route of the Pepperhill – Summerville 230 kV Line. A second Phase I survey was conducted in April 2018 along the route of the Williams – Pepperhill Line Segment. A report entitled *Cultural Resources Survey of the Summerville - Pepperhill 230 kV Transmission Line* was prepared for the Pepperhill – Summerville Line and submitted to the State Historic Peservation Office ("SHPO"). The SHPO issued a letter dated September 8, 2014 indicating their concurrence with the findings and recommendations contained in the report. Brockington prepared an addendum report entitled *Archaeological Survey for a Segment of the Williams - Pepperhill 230 kV Line,* dated April 16, 2018 for the Williams – Pepperhill Line Segment. It will be submitted to the SHPO for review as an addendum to the report for the Pepperhill – Summerville 230 kV Line. The two reports and the SHPO concurrence letter are included in this report (*Appendix C*), and the findings of the two Phase I archaeological investigations are discussed in Chapter 5, Section 5.9.

Architecture

Brockington conducted a literature review to determine all previously recorded architectural resources within 1.25 miles of the centerline of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment routes. The initial review was conducted in 2012; a second review was completed in April 2018 to confirm / update the 2012 findings and to add the Williams - Pepperhill Line Segment to the cultural resources investigation. Brockington found that virtually all historic resources within 1.25 miles of the Pepperhill – Summerville Line route are currently classified as not eligible for the NRHP and that no resources, regardless of NRHP classification, reside in the immediate vicinity of the proposed Williams - Pepperhill Line Segment.

Brockington's review of digital file records at the South Carolina Department of Archives and History ("SCDAH") revealed that one hundred sixteen previously recorded architectural resources reside within 1.25 miles of the future Lines, but none occur in the right-of-way. Chart 4.8-2 summarizes the findings of the architectural records review.

Chart 4.8-2: Classifications of Previously Documented Individual Architectural Resources within 1.25 Miles of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment Routes

Individual Resource Classifications	Number of Resources
NRHP-Listed	0
NRHP-Eligible	2
Not Eligible	114
Total	**116**

In addition to the records review to determine the locations and NRHP status of all previously documented architectural resources within 1.25 miles of the Lines' route, Brockington conducted an initial windshield reconnaissance survey ("windshield survey") in April 2012 throughout the area within 1.25 miles of the Line route. Brockington conducted a second windshield survey in April 2018 to confirm / update the findings of the initial windshield survey and to consider the Williams - Pepperhill Line Segment in the investigation. Each of the windshield surveys consisted of a vehicular inspection of architectural resources visible from all publicly accessible roads within 1.25 miles of the Lines' route. If a previously recorded resource was found to be inaccessible for inspection, Brockington examined current aerial photographs to make a reasonable determination as to whether or not the resource is still in existence. The purpose of the windshield surveys was to accomplish the following three objectives:

1. Evaluate all previously recorded architectural resources;
2. Locate architectural resources not previously recorded that appear to meet the minimum fifty-year age requirement for the NRHP; and,
3. Identify potentially eligible NRHP properties.

During the 2018 windshield survey, Brockington found that previous architectural surveys that had led to the identification of 116 resources (Chart 4.8-2) are comprehensive in terms of identifying historic resources. The following is a summary of Brockington's 2018 windshield survey findings with respect to the 116 previously documented resources:

1. Five of the 116 documented resources have been demolished;
2. Brockington believes 3 of the previously documented resources that were determined to be not eligible for the NRHP should be considered eligible for the NRHP for planning purposes (i.e., assessing potential impacts of proposed electrical transmission lines);

3. Brockington believes 1 documented resource (a church in Lincolnville) on the current list of 116 resources that is currently classified as not eligible for the NRHP should be classified as potentially eligible for the NRHP; and

4. Brockington identified two resources (houses) they believe should be classified as potentially eligible for the NRHP and added to the list of 116 documented resources.

According to Brockington, it is unlikely that any of the resources they believe should be reclassified from not eligible to eligible / potentially eligible or added to the current records will have a view of the proposed Lines. Brockington summarized their historic resources records review and windshield reconnaissance survey findings for the Pepperhill - Summerville Line in a letter report dated April 20, 2018 (*Appendix C*).

4.9 Visual Resources

The degree to which a planned transmission line will affect the scenic quality of the area or region through which it passes is directly related to the scenic quality of the area or region (i.e., the higher the scenic quality, the greater the potential for adverse visual impacts and vice versa). Scenic quality is derived from the interrelationship of multiple factors including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Using these factors, the United States Bureau of Land Management ("BLM") developed a visual resource inventory methodology for the purpose of rating the scenic quality of federal lands under its jurisdiction. The BLM methodology is a system whereby the visual quality of land areas can be scored on a numeric scale by considering and rating the interrelationship of multiple visual factors associated with specific areas. The factors include those which contribute to the scenic content and quality of specific areas including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.

On SCE&G's behalf, landscape architects and professional geographers employed by UC Synergetic, LLC ("UCS") executed the BLM scenic quality methodology to assess and rate the scenic quality of three specific areas within which the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will be constructed. The three areas include sections of the Lines' routes that were delineated to include scenic factor similarities that are generally specific to each individual area and are not necessarily prevalent in adjacent areas.

Chart 4.9-1, adopted from the BLM's Visual Resource Rating System, provides information about the criteria used to assess scenic quality in each of the three delineated areas along the Lines' route.

Chart 4.9-1: Scenic Quality Rating Criteria

Explanation of Rating Criteria
Landform
Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, (for example, the Grand Canyon) or they may be exceedingly artistic and subtle as certain badlands, pinnacles, arches, and other extraordinary formations.
Vegetation
Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetational features, which add striking and intriguing detail elements to the landscape (e.g., gnarled or wind-beaten trees, and Joshua trees).
Water
That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.
Color
Consider the overall color(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "color" are variety, contrast, and harmony.
Adjacent Scenery
Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance that adjacent scenery will influence scenery within the rating unit will normally range from 0-5 miles, depending upon the characteristics of the topography, vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.
Scarcity
This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.
Cultural Modifications
Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit. Rate accordingly.

The scenic quality rating criteria were used to evaluate and score the three delineated areas according to each one's unique scenic quality as measured and evaluated by the seven scenic quality criteria explained in Chart 4.9-1. Guidance for scoring defined areas for each scenic quality rating criterion is provided in Chart 4.9-2.

Chart 4.9-2: Scenic Quality Inventory and Evaluation Chart

Key Factors	Rating Criteria and Score	Rating Criteria and Score	Rating Criteria and Score
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features that are dominant and exceptionally striking and intriguing such as glaciers. **5**	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. **3**	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **5**	Some variety of vegetation, but only one or two major types. **3**	Little or no variety or contrast in vegetation. **1**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **5**	Flowing, or still, but not dominant in the landscape. **3**	Absent, or present, but not noticeable. **0**
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. **5**	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. **5**	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc.* **5+**	Distinctive, though somewhat similar to others within the region. **3**	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. **2**	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**	Modifications add variety but are very discordant and promote strong disharmony. **-4**

Note: Score values within each Key Factors category range from minimum to maximum scores for the key factor. It is possible to assign any numeric score within the minimum to maximum range based on scenic quality conditions observed.

***** *A rating greater than 5 can be given to this criterion in the scarcity category but should be supported by written documentation.*

By applying the appropriate rating criteria and scores for each of the key factors shown in Chart 4.9-2 based on actual scenic conditions present along the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment, total scores were derived for each of the three

individual sections of the Lines' route that indicate the scenic quality of each section. The following is the BLM explanation of scenic quality, which is indicated by the total scores:

Total Score	**Scenic Quality**
19 or higher	High Scenic Quality
12-18	Moderate Scenic Quality
11 or lower	Low Scenic Quality

Scoring Methodology

UCS, on SCE&G's behalf, conducted a GIS analysis of vegetation, hydrography, land use, and topography along the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment to gain insight into key scenic quality factors including landform, vegetation, water, color, and influence of adjacent scenery. Additionally, a windshield survey was conducted to observe, record and photograph visual conditions along public roads in the immediate vicinity of the Lines' route. As previously explained, the Lines' route was segmented into three sections based on similarity of scenic conditions represented by each section. Finally, each section was scored using the BLM scoring protocol. The following is a listing of the three scenic quality sections along the Lines' route, which are shown in Figure 4.9-1:

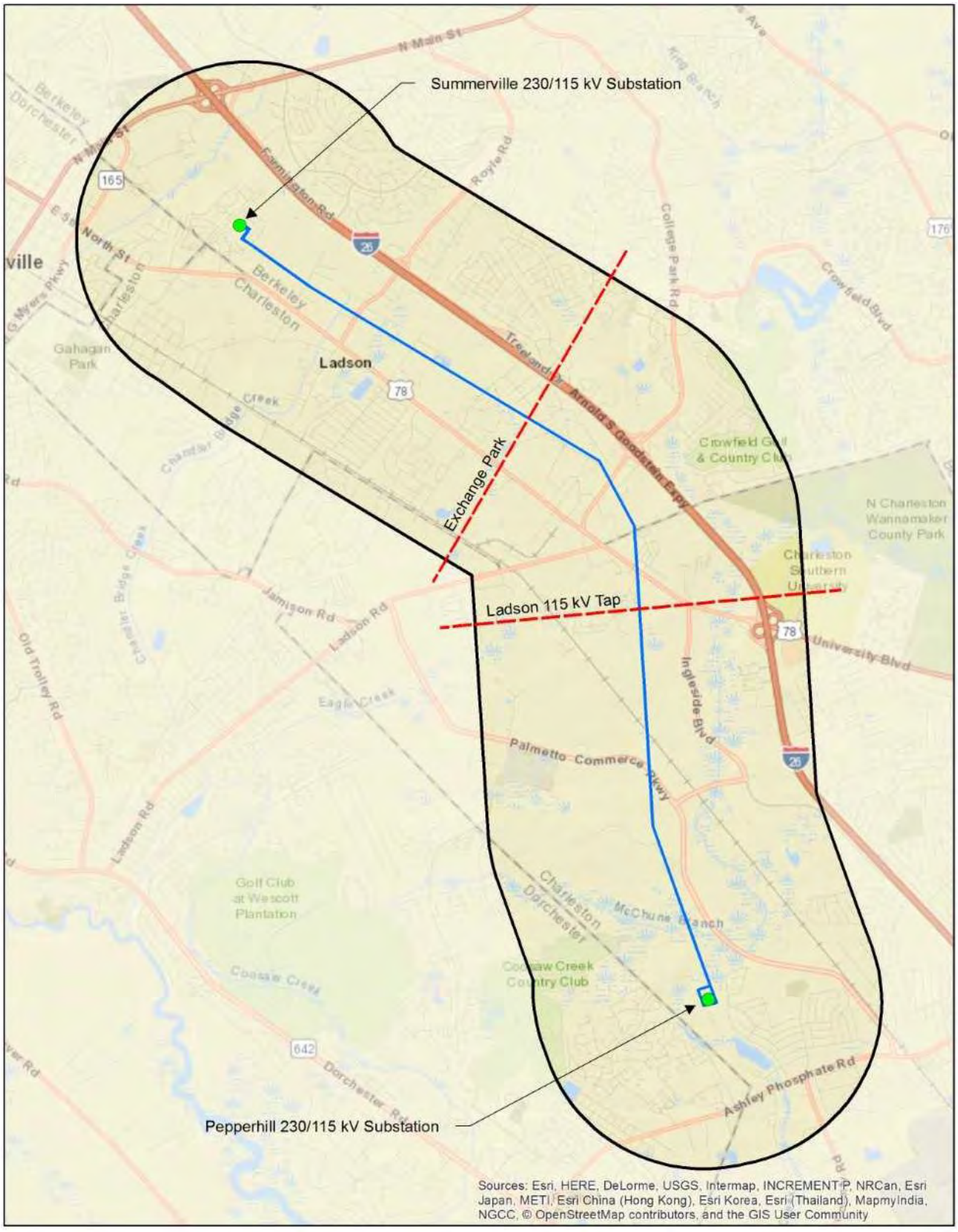
Scenic Quality Section 1: Summerville 230/115 kV Substation to Exchange Park

Scenic Quality Section 2: Exchange Park to Ladson 115 kV Tap

Scenic Quality Section 3: Ladson 115 kV Tap to Pepperhill 230/115 kV Substation

Note: Scenic Quality Sections 1 and 2 pertain only to the Pepperhill – Summerville 230 kV Line. Scenic Quality Section 3 includes the Pepperhill – Summerville Line and the approximately 1,000 foot long Williams – Pepperhill Line Segment, which is located immediately adjacent to the Pepperhill Substation.

Figure 4.9-1: Scenic Quality Segments



Scenic Quality Section 1: Summerville 230/115 kV Substation to Exchange Park


Photo: Mendenhall Street


Photo: South Pointe Boulevard


Photo: U.S. Highway 78


Photo: Wisteria Street

From the Summerville 230/115 kV Substation, the Pepperhill - Summerville 230 kV Line will run southeast within existing, cleared SCE&G right-of-way for approximately 2.71 miles before reaching the northern boundary of the Exchange Park area. The line will cross five roads within this 2.71-mile segment, four of which are dead-end roads accessed from U.S. Highway 78 and the fifth, Royle Road, connects U.S. Highway 78 to Interstate Highway 26. Although small pockets of residential land use are present within this section, the section is primarily characterized by highway commercial development along U.S. Highway 78 consisting of numerous used car lots, three auto salvage and scrap metal yards, and light manufacturing facilities. The scenic quality of this section is diminished by the incongruent development pattern that has occurred and lack of identifiable elements that contribute positively to the visual landscape. Mixed pine/hardwood tree cover, however, substantially screens views of the existing transmission line corridor within which the Pepperhill - Summerville 230 kV Line will reside from the majority of public viewpoints.

Summerville 230/115 kV Substation to Exchange Park Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Some variety of vegetation, but only one or two major types. **2**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add little or no visual variety to the area, and introduce discordant elements. **-3**

Total Scenic Quality Score: 2

Scenic Quality Section 2: Exchange Park to Ladson 115 kV Tap

Photo: Exchange Park entrance at U.S. Highway 78


Photo: Exchange Park entrance view from U.S. Highway 78


Photo: College Park Road / U.S. Highway 78 Intersection


Photo: State Road S-8-62 / Wimberly Drive Intersection

After running south through the Exchange Park for approximately 0.55 miles, the Pepperhill - Summerville Line will turn slightly south-southeast and run for approximately 0.56 miles, crossing College Park Road (State Road S-8-62), before reaching an angle point just north of Ancrum Road. Exchange Park and the adjacent Coastal Carolina Flea Market are significant landmarks and visual elements in the community. While functional for its intended use of accommodating thousands of people, the scenic quality of the Exchange Park from the most common public vantage points along U.S. Highway 78 is diminished by the vast expanse of grassed parking, mast lighting, billboard signage, and prefabricated metal buildings.

At the angle point north of Ancrum Road, the Pepperhill – Summerville Line will turn south and run for approximately 0.43 miles, crossing Ancrum Road, U.S. Highway 78 and passing through a mobile home development before reaching the southern boundary of the scenic quality section

where the Ladson 115 kV Tap Line intersects the existing right-of-way within which the Pepperhill – Summerville Line will reside.

As a result of the access College Park Road provides between Interstate 26 and U.S. Highway 78, mainstream highway businesses, grocery stores, fast-food restaurants, gas stations and industrial parks are strong visual elements within this scenic quality section of the line. In general, the cultural modifications in this section of the Pepperhill – Summerville Line route have a negative effect on the section's scenic quality rating.

Exchange Park to Ladson 115 kV Tap Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Little to no variety or contrast in vegetation. **1**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add little or no visual variety to the area, and introduce some discordant elements. **-4**

Total Scenic Quality Score: 0

Scenic Quality Section 3: Ladson 115 kV Tap to Pepperhill 230/115 kV Substation

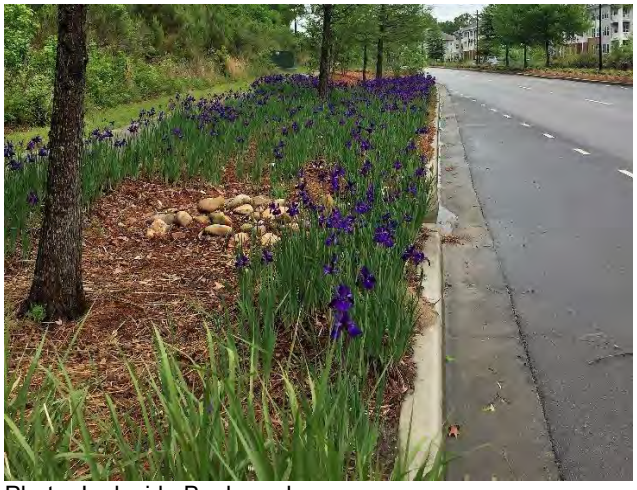


Photo: Ingleside Boulevard

Photo: Ingleside Boulevard

Photo: Ingleside Boulevard Near Weber Boulevard

Photo: Palmetto Commerce Parkway

From the Ladson 115 kV Junction, the Pepperhill – Summerville Line route passes through large expanses of mixed pine and scrub/shrub forests for approximately 1.13 miles to a crossing over the Southern Railroad. The Line's route continues south for 0.73 miles through Phase I and Phase II of the Ingleside planned mixed use development. The Line's route then turns slightly south-southeast for 1.30 miles and passes through mostly undisturbed mature forests before reaching the northern boundary of the Pepperhill 230/115 kV Substation, which is the beginning point of the short segment of the Williams – Pepperhill 230 kV Line described in this report as the Williams – Pepperhill Line Segment.

Development within this Scenic Quality Section is in its early stages, but the master planning and early stage construction of the Ingleside development have been conducted in a way that contributes positively to the scenic quality of the area. Electric distribution facilities have been placed underground, stormwater treatment facilities along the roads have been incorporated as landscape

amenities, and roadways and bridges have been planned in a way that seamlessly connects the built and natural environment. This Scenic Quality Section of the, which includes the Pepperhill – Summerville Line and Williams – Pepperhill Line Segment, still lacks many of the landscape and scenic features, such as water and topography, necessary to classify it as having a higher degree of scenic quality, but unlike Scenic Quality Sections 1 and 2, cultural modifications do not diminish overall scenic quality.

Ladson 115 kV Tap to Pepperhill 230/115 kV Substation Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Some variety of vegetation, but only one or two major types. **3**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add favorably to visual variety while somewhat promoting visual harmony. **1**

Total Scenic Quality Score: 7

Summary

Application of the BLM methodology for assessing scenic quality along the route of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment reveals the entirety of the Lines' routes will be located within low scenic quality areas (total scenic quality scores of 11 or less). This evaluation does not necessarily indicate unattractiveness of the majority of the area; rather, scores indicating low scenic quality represent a metric that correctly indicates lack of topographic high points that would offer interesting elevation relief and long views and vistas, lack of landscape diversity (water, texture, color), lack of adjacent scenic features visible from the immediate area of the Lines' route, and the degree to which the Lines pass through areas that are highly modified by various types of development and infrastructure. Total Scenic Quality Scores are also indicative of visual sensitivity present in defined areas with regard to the addition of transmission lines through the areas. Generally, high Total Scenic Quality Scores are indicative of areas where the appearance of new transmission lines would be more incongruent than would they be in areas where Total Scenic Quality Scores are low.

5.0 CONSEQUENCES OF THE PROPOSED ACTION

Note: Certain figures referenced in this chapter (5.1-A, 5.1-B, 5.3-A, 5.4-A, 5.4-B, 5.5-A, 5.6-A, 5.8-A, 5.9-A, 5.10-A, 5.11-A, and 5.12-A) are included in this report under the "Figures" tab.

This chapter describes short- and long-term effects to environmental resources, land use, cultural resources and scenic resources that will occur as a result of construction and operation of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment. An array of environmental, cultural resource, land use and scenic data were collected from various local, state and federal agencies and developed from field studies to support the findings presented in this chapter. The data were organized into GIS data layers and mapped for the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segmen data collection and analysis area, which includes the geographic area extending outward as far as 1.25 miles on each side of the centerline of the future Lines for the analysis of cultural resources (above ground/architectural) and 1.0 mile for analysis of rare, threatened, endangered and protected species. The potential effects to other resources were analyzed for an area extending outward 1,000 feet from the future Lines and/or the area within the existing right-of-way in which the Lines will be located.

The information provided in this chapter supports the statement of benefits regarding the utilization of existing, cleared rights-of-way for new transmission lines that is discussed in Chapter 2. The analysis of the collected data and conclusions of the comprehensive studies find that construction of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will have no adverse impacts on land use, soils, wetland/streams, flood zones, land cover, wildlife, protected species, cultural resources, visual resources, population centers or aviation. The absence of impacts is significantly due to the utilization of existing, cleared rights-of-way for the Lines.

5.1 Land Use

SCE&G collected and mapped existing and future land use data over the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment routes (*Figure 5.1-A)*. The zoning classifications were mapped where applicable. Typically, the most significant effect to land use resulting from construction of electrical transmission lines is the permanent restriction on building erection, timber production and other uses within the right-of-way that could interfere with the reliable, safe operation of the lines. Since the Lines will be built within existing SCE&G right-of-way, those restrictions have been in force and effect for decades; therefore, the Pepperhill - Summerville Line and Williams - Pepperhill Line Segment will have no effects on existing land use. Permitted uses in the right-of-way include pastures, crop production, roads, driveways, parking lots, and other uses that will not interfere with the safe, reliable operation of the line. Chart 5.1-1 lists the acreages of land uses within the Lines' right-of-way.

Chart 5.1-1 Affected Land Use

Land Use	Acres
Electrical Transmission Right-of-Way - South Carolina Electric and Gas	83.8
Road Right-of-Way	3.1
Electric Power Facility	4.8
Railroad Right-of-Way	0.7

The locations of all occupied buildings within 1,000 feet of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment routes were digitized from aerial photography and field studies and compiled in a GIS data base (*Figure 5.1-B)*. Chart 5.1-2 displays the quantity of occupied buildings that will be within various distances of the future Line.

Chart 5.1-2 Proximity of Occupied Buildings

Proximity to the Future Line	Number
Number of occupied buildings within 200' of the proposed line	82
Number of occupied buildings between 200’ and 500’ of the proposed line	359
Number of occupied buildings between 500’ and 1000’ of the proposed line	508
Total	**949**

The Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will have no effect on existing, occupied buildings or their current uses.

5.2 Soils

Prudent construction and erosion-control measures will be used to avoid potential minor, short-term impacts, and soils will be stabilized, as necessary, with vegetation as construction progresses over the length of the affected right-of-way. No earth grading activities are anticipated due to the utilization of existing right-of-way and access roads. SCE&G will comply with the South Carolina Department of Health and Environmental Control Regulation 72-300 through 72-316 (June 28, 2002) with all line construction operations and will employ seeding and erosion and sediment control measures that meet or exceed local, state, and federal requirements

5.3 Prime Farmlands and Farmlands of Statewide Importance

According to the United States Department of Agriculture (“USDA”), Natural Resources Conservation Service, prime farmland is comprised of soils (and slopes) that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The land could be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water. Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to sound farming methods. In general, prime

farmlands have an adequate and dependable moisture supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time. Typically, they do not flood during the growing season or they are protected from flooding.

Farmlands of Statewide Importance are soils that are, in addition to prime farmland, important for the production of food, feed, forage, fiber, and oil seed crops. Generally, farmlands of statewide importance include soils that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce crop yields as high as prime farmlands if conditions are favorable. Chart 5.3-1 lists the acreage of Prime Farmland and Farmland of Statewide Importance that occur in the right-of-way within which the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will be built (*Figure 5.3-A*).

Chart 5.3-1 Affected Prime Farmland and Farmland of Statewide Importance

Classification	Acres
Prime Farmland	26.2
Farmland Of Statewide Importance	50.9
Not Prime Or Important Farmland	15.3

Effects to prime farmland soils and soils associated with farmland of statewide importance resulting from construction of the Lines will be minimal. Virtually no disturbance to qualifying soils will occur as a result of transmission line construction since no new access roads are required and no grading will occur that would disturb the “plow layer.” Direct impacts to the topsoil layer will occur only where new structures are installed either by auguring for foundation installations or by vibratory foundation caisson installations. Assuming 62 new structures will be installed at an average spacing of 550-feet along the proposed Lines where they will reside in either prime farmland soils or soils associated with farmland of statewide importance (approximately 6.25 miles of the Pepperhill - Summerville Line and the entire 0.19 mile Williams - Pepperhill Line Segment), the total disturbance to these two soil classifications will be approximately 0.04 acres.

5.4 Wetlands and Stream Buffers

Wetlands are defined by 33 CFR Part 328 and protected by Section 404 / 401 of the U.S. Clean Water Act. Based on a wetland survey and delineation conducted by PEC, it has been determined that approximately 54.4 acres of wetlands reside in the right-of-way and on portions of the Pepperhill and Summerville Substaton properties within which the Pepperhill - Summerville 230 kV Line and Williams – Pepperhill Line Segment will be built (*Figure 5.4-A*). Since the construction

zone for the Lines will be confined to approximately ½ of the total existing right-of-way width, it was determined that approximately 28.9 acres of wetlands reside in the "zone of construction" within the right-of-way within which the Pepperhill - Summerville Line and Williams – Pepperhill Line Segment will be built.

PEC delineated approximately 295 linear feet of stream channels (0.1 acre) that are present in the right-of-way within which the Pepperhill - Summerville Line will be built; none are present in the right-of-way within which the Williams - Pepperhill Line Segment will be built.

The waters/wetlands delineation performed by PEC was verified by the US Army Corps of Engineers ("USACE") in late 2014, and a Jurisdictional Determination letter was subsequently issued dated January 28, 2015.

To the extent practical, SCE&G will design the Pepperhill - Summerville Line to span wetlands; however, where structures may be required in wetlands, access to them for construction purposes will be accomplished on mats, vibratory caisson type foundations will be utilized and no permanent roads will be constructed in the wetlands. No fill will be placed in wetlands, and the function of wetlands crossed by the Pepperhill - Summerville Line and Williams – Pepperhill Line Segment will not be changed.

The Pepperhill - Summerville Line will cross several streams (Section 4.4; *Figure 5.4-B*) along its route from the Summerville 230/115 kV Substation to the Pepperhill 230/115 kV Substation. Any existing low-growing vegetation in the stream buffer zones are presently beneath the existing lines in the right-of-way; therefore, clearing in stream buffer zones will not likely be required. The Williams-Pepper Line Segment will cross no streams.

Construction of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will present a minor potential for erosion and runoff contributions to nearby streams and wetlands; however, the use of existing, established right-of-way significantly minimizes this potential impact. SCE&G will carefully design and implement measures and plan work to prevent any sediment-laden runoff beyond designed erosion-control devices (sediment traps, silt fences, etc.). SCE&G will comply with the South Carolina Stormwater Management and Sediment Reduction Act related to water quality protection and will consider the recommendations of various regulatory agencies, including the South Carolina Department of Natural Resources, South Carolina Department of Health and Environmental Control, the U.S. Army Corps of Engineers, etc. SCE&G will apply its longstanding practices and procedures for operations within wetlands and riparian areas, which have proven to be effective in preventing temporary, construction-related impacts to wetlands, and all activities will be conducted in a manner that will not jeopardize South Carolina

water quality standards and existing water uses. The erosion-control measures and Best Management Practices employed will be sufficient to prevent any sediment movement beyond construction limits during a 10-year storm event. Measures will also be taken to prevent sediment, trash, debris, and other man-made pollutants from entering sensitive areas.

Before construction begins on the Pepperhill - Summerville Line and Williams - Pepperhill Line Segment, construction plans will be provided to supervisors that will show structure locations and any sensitive areas, including stream buffers and wetlands. Any required state and/or federal permits related to wetlands and water quality protection will be obtained before construction begins, and periodic inspections will be performed during construction to ensure compliance planned environmental protection measure and all permit conditions.

Chart 5.4-1 lists all hydrological resources within the Lines' right-of-way that could potentially be affected by construction activities; however, because of the measures SCE&G takes to protect hydrological resources, no impacts will occur.

Chart 5.4-1 Wetlands and Stream Buffers within the Pepperhill - Summerville Line and Williams - Pepperhill Line Segment Right-of-Way

Condition within the Right-of-Way	Acres
River, lake or pond in the right-of-way	0.0
Wetland within the right-of-way or on substation property impacted by clearing within the wetland	0.0
Wetland within the right-of-way **not** impacted by clearing within the wetland	28.8
Upland within the right-of-way or on substation property requiring hand-clearing within 100' of any stream, river, lake, pond, or wetland	0
Upland within the right-of-way and **not** requiring clearing within 100' of any stream, river, lake, pond, or wetland	19.5

5.5 Flood-Prone Areas

SCE&G obtained the Federal Emergency Management Agency National Flood Insurance Program maps for Charleston and Berkeley Counties, South Carolina, and added the data to the GIS database (*Figure 5.5-A*). Chart 5.5-1 summarizes the flood zones that will be within the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment right-of-way.

Chart 5.5-1 FEMA Flood Zones Effects

Flood Zone Classification	Acres
Zone AE - Floodway	0.0
Zone AE - Areas of 100-Year Flood (Base Elevation Determined)	0.0
Zone A - Areas of 100-Year Flood (No Flood Elevations Determined)	4.7
Zone X - Areas of 500-Year Flood; 100-Year Flood (Less Than 1' Depth)	0.0
Zone X - Areas Determined to be Outside 500-Year Flood Plain	87.8

The USDA, Rural Utility Service Bulletin 1794A-600, states the following in Section 3.2 regarding the placement of electrical transmission line structures in floodplains: *"Floodplain management requires Federal agencies to avoid actions, to the extent practicable, which will result in the location of facilities in floodplains and/or affect floodplain values. Facilities located in a floodplain may be damaged seriously by floodwaters or may change the flood handling capability of the floodplain or the pattern or magnitude of the flood flow. Normally single pole structures and buried cable should be considered to have no significant impact on floodplain values."* The single pole structures that will be used on the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will have no measurable effect on floodplain values, and the reliability of the Lines will not be affected by the segments of the Lines that will reside in floodplain zones.

5.6 Land Cover

An inventory of land cover in the Summerville–Pepperhill 230 kV Line and Williams - Pepperhill Line Segment right-of-way was made through the use of 2014 Landsat Satellite imagery, 2016-2018 aerial photography (Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, the GIS User Community, and Google Earth), field inspections and results of the biological investigation within the right-of-way. ERDAS Imagine, a geospatial data authoring system, was used to aggregate the various land cover into distinct classifications (Figure 5.6-A). Chart 5.6-1 lists the quantity and types of land cover in the Lines' right-of-way

Chart 5.6-1 Land Cover Effects

Classification	Acres
Barren	0.0
Grass/Pasture	32.7
Scrub/Shrub	13.7
Urban/Built-up	17.2
Wetland	28.8

Since the existing right-of-way within which the Pepperhill - Summerville Line and Williams - Pepperhill Line Segment will be built is cleared, construction of the Lines will have negligible effects on land cover. The only measurable effects will be temporary disturbance to grass/pasture and scrub/shrub land cover types in the existing right-of-way.

5.7 Wildlife

Construction of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will have no adverse effect on wildlife or wildlife habitat since no land clearing will be required in the existing, cleared right-of-way within which the Line will be located.

An issue associated with large raptors is their vulnerability to power line electrocution. Their large size, wingspan, and perching make them susceptible to electrocution on certain transmission line designs. Transmission line structures with inadequate spacing between phases (i.e., less than 60 inches of separation between conductors and/or grounded hardware) can cause raptor electrocutions. With this in mind, the USFWS has recommended, under authority of the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act, that all new transmission structures be equipped with design features that prevent these electrocutions. Such features typically include designs that (1) make the distance between phase conductors greater than the wingspread of the bird that is landing, perching, or taking off; and (2) increase the distance between grounded hardware (e.g., ground-wires) and an energized conductor to more than the largest bird's wingspread or the distance from the tip of the bill to the tip of the tail. The 230 kV structures that will be used on the Summerville–Pepperhill 230 kV Line and Williams - Pepperhill Line Segment will be "raptor safe" and meet the guidelines recommended in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (Avian Power line Interaction Committee 2006); therefore, raptor electrocutions are not anticipated on this project.

5.8 Rare, Threatened, or Endangered Resources

PEC personnel conducted a protected species literature and records search in April 2012, and updated the search in April 2018, to determine the presence of known occurrences of federally and state-listed animal and plant species on or within a one-mile of the right-of-way within which the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will be located. The literature and records searches revealed no federal-listed species within one mile of the project; the following state-listed species have been documented within one mile of the project area (*Figure 5.8-A*).

- one known occurrence of least tern (*Sterna antillarum*);
- two occurrences of yellow fringeless orchid (*Platanthera integra*);
- one occurrence of green fringe orchid (*P. lacera*);
- one occurrence of crestless plume orchid (*Pteroglossapis ecristata*); and,
- one occurrence of scarlet Indian-paintbrush (*Castilleja coccinea*).

None of the documented occurrence locations are within the right-of-way within which the Pepperhill - Summerville Line and Williams - Pepperhill Line Segment will be built. Further, SCE&G engaged PEC to conduct a field investigation of the Lines' route to verify the presence or absence of state-and/or federal-listed species and none were found; therefore, no adverse effects to protected species will occur from construction of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment.

The results of the protected species records search and field investigation are summarized in PEC's report entitled *"Federally-Listed Threatened and Endangered Species/State Rare, Threatened, and Endangered Species Assessment and Jurisdictional Waters/Wetlands Assessment (for the) Proposed Pepperhill - Summerville 230kV Line and Williams - Pepperhill Line Segment, Berkeley and Charleston Counties, South Carolina"* (*Appendix B*).

5.9 Cultural Resources

Cultural resources are categorized as 1) archaeological resources, which are generally below ground resources, and 2) architectural resources (above ground resources). To determine effects, if any, the future Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment may have on the two categories of cultural resources, Brockington conducted research at the South Carolina Institute of Archaeology and Anthropology ("SCIAA") and the South Carolina Department of Archives and History ("SCDAH") to determine previously recorded archaeological and architectural resources that reside within the vicinity of the Lines' routes (within 0.5 miles of the Lines for archaeological resources and within 1.25 miles for architectural resources). Additionally, SCE&G engaged Brockington to conduct a "windshield reconnaissance survey" to inspect previously recorded architectural resources within 1.25 miles of the Lines' routes and other resources, if any, that are not recorded but, in the opinion of Brockington, may be eligible for the NRHP. Finally, SCE&G engaged Brockington to conduct comprehensive Phase I archeological investigations along the routes of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment to assess previously recorded archaeological sites in the right-of-way and to determine if other non-recorded archaeological sites are present.

Brockington's findings (*Appendix C*) and the predicted effects to cultural resources that may occur as a result of construction and operation of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment are discussed in this section in each of the two cultural resource categories.

Archaeological Resources

Brockington conducted a Phase I archaeological investigation within the right-of-way of the Pepperhill - Summerville 230 kV Line in May and July 2014. Brockington was engaged again in April 2018 to conduct a Phase I archaeological investigation within the right-of-way of the Williams - Pepperhill Line Segment, which was not included in the 2014 investigations. The 2014 and 2018 investigations included the areas on the Pepperhill and Summerville Substation properties that will be affected by the Lines' connection to the substations.

During the 2014 investigation along the route of the Pepperhill – Summerville Line, Brockington visited the locations of three previously recorded archaeological sites (identified as sites number 38CH230, 38CH1014, and 38CH2159) that, according to SCDAH records, are in the Lines' right-of-way.

Site 38CH230, located at Windsor Hill Plantation, was the site of General William Moultrie's grave. The site has been destroyed and all burials were removed in the 1970s.

Brockington confirmed that site 38CH1014 has been destroyed by grading and the placement of fill materials (the grading and filling appear to be associated with an active landfill just north of the reported location of the site).

Site 38CH2159, an extensive inland rice dike system located near the east end of McChune Branch, was identified in 2008 during the cultural resources survey of the Palmetto Commerce Parkway Extension Project. At that time, the extent of the site was mapped to the eastern edge of the right-of-way within which the Pepperhill - Summerville Line will be built. When Brockington visited the site in conjunction with the investigation for the Pepperhill - Summerville Line, they determined that the system of dikes extend into the right-of-way. Brockington recommends that the site remain "eligible for the NRHP" and that placement of the Line structures be planned to avoid ditches and embankments that are elements of the rice dike system (i.e., the Line should be planned to span over these elements). Brockington concluded by stating in its report, *"Given that inland rice field elements of NRHP-eligible Site 38CH2159 are avoided/spanned, and wooded areas adjacent to and on the embankment and ditches to the northwest of the Pepperhill substation are cleared by hand, proposed land-disturbing activities in the Pepperhill - Summerville 230 kV Transmission Line project will not affect any historic properties and should be allowed to proceed without further management consideration. If these embankments/ditches cannot be avoided, then all proposed mitigation of adverse effects to Site 38CH2159 will be developed in consultation with SCDAH."*

As recommended by Brockington, SCE&G will design the Pepperhill – Summerville 230 kV Line to span the elements of the rice field embankments and ditches in the right-of-way. Further, no tree clearing will be required within or near Site 38CH2159; therefore, the site will not be disturbed during construction or operation of the Pepperhill – Summerville 230 kV Line.

The Phase I archaeological investigation conducted in 2018 confirmed that no archeological resources are present along the route of the Williams - Pepperhill Line Segment. Consequently, no adverse effects to archaeological resources will occur as a result of construction and operation of the Pepperhill – Summerville Line and Williams – Pepperhill Line Segment.

With regard to inadvertent discoveries of cultural materials, all construction supervision will be given "cultural materials recognition" training designed to facilitate immediate recognition of possible cultural materials that may be unearthed during construction activities. The supervisors will be instructed to stop construction activities in any specific area where unearthed material appears to be cultural material and to contact a designated person who will arrange an inspection of the suspected cultural material by a qualified expert. Construction shall not resume in such areas until the suspected material is determined to be insignificant or SCE&G and the SCDAH have agreed on an action plan that will allow the resumption of construction.

Architectural Resources

SCDAH records indicate 116 previously documented architectural resources within 1.25 miles of the proposed Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment (*Figure 5.9-A*). The three SCDAH classifications and number of resources in each are as follows:

Classification	Number of Resources
NRHP Eligible	2
Not eligible for the NRHP	114

No architectural properties designated as "National Historic Landmarks" or "Historic Districts" are recorded within 1.25 miles of the routes of the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment. During the windshield reconnaissance survey conducted in April 2018, Brockington visited each of the 116 previously recorded architectural resources. The following is a summary of Brockington's 2018 windshield survey findings with respect to the 116 previously documented resources:

1. Five of the 116 documented resources have been demolished;
2. Brockington believes 3 of the previously documented resources that were determined to be not eligible for the NRHP should be considered eligible for the NRHP for planning purposes (i.e., assessing potential impacts of proposed electrical transmission lines);
3. Brockington believes 1 documented resource (a church in Lincolnville) classified as not eligible on the current list of 116 resources should be classified as potentially eligible for the NRHP; and
4. Brockington identified two resources (houses) that are not on the current list they believe should be classified as potentially eligible for the NRHP and added to the list of 116 documented resources;

According to Brockington, it is unlikely that any of the resources they believe should be reclassified from not eligible to eligible / potentially eligible or the two houses they believe should be added to the current list will have a view of the proposed Lines. Additionally, following the windshield survey Brockington completed in 2012, UC Synergetic, LLC ("UCS"), working closely with Brockington on SCE&G's behalf, conducted a viewshed analysis to determine the footprint of the geographic area within 1.25 miles of the Pepperhill - Summerville 230 kV Line route where views of the future Line may be possible (there are no documented resources within 1.25 miles of the proposed Williams – Pepperhill Line Segment). The analysis was based on line design assumptions that included the approximate locations and heights of the new 230 kV transmission line structures that will be utilized on the Pepperhill - Summerville 230 kV Line. Computer modeling was completed based on the top elevation of each line structure, taking into consideration topography and vegetation, to display geographic areas surrounding the proposed Line where visibility of it will be likely and not likely. This mapping displayed the entire area surrounding the future Line within which the 111 historic resources (116 less the 5 that have been demolished) on the SCDAH list are located. UCS conducted a visual impact analysis from each of the resources on the list that are currently classified as eligible for the NRHP (Woodstock Cemetery and Resource 496017). Further, UCS completed the visual analysis for each resource Brockington believes may be potentially eligible, even though they are now documented to be not eligible on the list (Resources 4960253.00, 4960253.01, 4960253.02 and 4960718). Following the computerized view probability analysis, landscape architects visited each of the resources that were analyzed in the viewshed analysis to confirm the accuracy of the predicted view probability. As indicated by the computerized view analysis and confirmed during the field visit, none of the resources within 1.25 miles of the Pepperhill – Summerville Line classified as NRHP eligible will have a view of the proposed Line. Likewise, none of the resources on the SCDAH list Brockington believes should be reclassified to potentially eligible from the current not eligible classification will have a view of the Pepperhill – Summerville Line.

Given the systematic approach SCE&G has taken to identify cultural resources prior to construction and will take to protect them during construction and operation of the Lines, no adverse impacts to cultural resources will occur as a result of constructing and operating the Pepperhill – Summerville 230 kV Line and Williams – Pepperhill Line Segment.

5.10 Visual Resources

The visual implications of transmission lines are influenced by several factors. These include the distance from the viewer, the number of structures viewed, whether visible structures are seen against backdrops (vegetation, terrain, man-made elements) or silhouetted against the skyline, the

degree of foreground elements that will offer screening, the amount of vegetative modification which contrasts with surrounding landscapes, and the overall scenic condition (landscape content or context) of the area in which the facility is seen. The potential visual implications of the future Summerville–Pepperhill 230 kV Line and Williams - Pepperhill Line Segment were carefully evaluated, which included field studies to determine where the future line may be visible from public roads (*Figure 5.10-A*). The Lines will have very low overall visual effects for the following four (4) primary reasons:

1. The Lines will share an existing SCE&G right-of-way with other existing transmission lines for their entire lengths;
2. The single-pole, double-circuit structures that will be used to construct the Pepperhill - Summerville Line will replace existing 230 kV single-circuit wooden H-frame structures for the entire length of the Line;
3. The northern portion of the Pepperhill - Summerville 230 kV Line, approximately 4.1-miles in total length, will reside in an area where visual conditions are highly modified by residential, commercial, industrial, and institutional development;
4. The southern segment of the Pepperhill - Summerville 230 kV Line route, approximately 3.4 miles long, will be through a generally remote area where existing trees will reside on each side of the right-of-way for virtually all of the distance; and,
5. The Williams - Pepperhill Line Segment will be constructed in right-of-way immediately adjacent to the Pepperhill Substation and alongside existing 115 kV transmission lines. The visual character of the area is modified by electrical transmission infrastructure and any additional modification resulting from the Line will be negligible.

5.11 Population

Population distribution and density was modeled as a GIS data layer along the Pepperhill - Summerville 230 kV Line and Williams – Pepperhill Line Segment based on Year 2010 Census data (*Figure 5.11-A*). Chart 5.11-1 displays incremental lengths of the future Lines that will pass through various population density areas.

Chart 5.11-1: Population Density along the Pepperhill - Summerville Line and Pepperhill - Summerville Line Segment

Acres per Person	Line Route Miles Where Population Condition Exists
< 0.25 Acres per Person	0.1
0.25 – 0.5 Acres per Person	0.3
0.51 – 1.0 Acres per Person	3.3
1.1 – 2.0 Acres per Person	2.3
2.1 – 4.0 Acres per Person	0.2
4.1 – 10.0 Acres per Person	0.2
> 10 Acres per Person	1.9

The analysis of the 2010 Census data provides insight into the proposed routes of the Summerville–Pepperhill 230 kV Line and Williams - Pepperhill Line Segment regarding population center avoidance. Virtually all of the future line will reside in areas where the acres-per-person ratio is greater than ½ acre per person. Almost half of the line will reside in areas where the acres-per-person ratio is greater than 1 acre per person. By utilizing existing right-of-way that largely avoids population centers, the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will have no measurable current or future effects on populated areas.

5.12 Aviation

Federal Regulations, Title 14-Chapter 1-Subchapter E-Part 77 (Safe, Efficient Use, and Preservation of the Navigable Airspace) establishes standards for protecting navigable airspace and sets forth requirements for Federal Aviation Administration ("FAA") notification of proposed construction that could potentially affect the navigable airspace. Specifically, the notification "triggers" set out in Part 77 that are, or possibly could be, applicable to construction of transmission lines include the following (underlining is added for emphasis):

1) If requested by the FAA, or if any of the following types of construction or alteration are proposed, a notice must be filed with the FAA:
   a) Any construction or alteration that is more than 200 feet above ground line at its site.
   b) Any construction or alteration that exceeds an imaginary surface extending outward and upward from the aviation facility at any of the following imaginary surface slopes:
      i) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each public use airport listed in the Airport/Facility Directory with its longest runway more than 3,200 feet in actual length, excluding heliports.
      ii) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each public use airport listed in the Airport/Facility Directory with its longest runway no more than 3,200 feet in actual length, excluding heliports.

iii) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport.

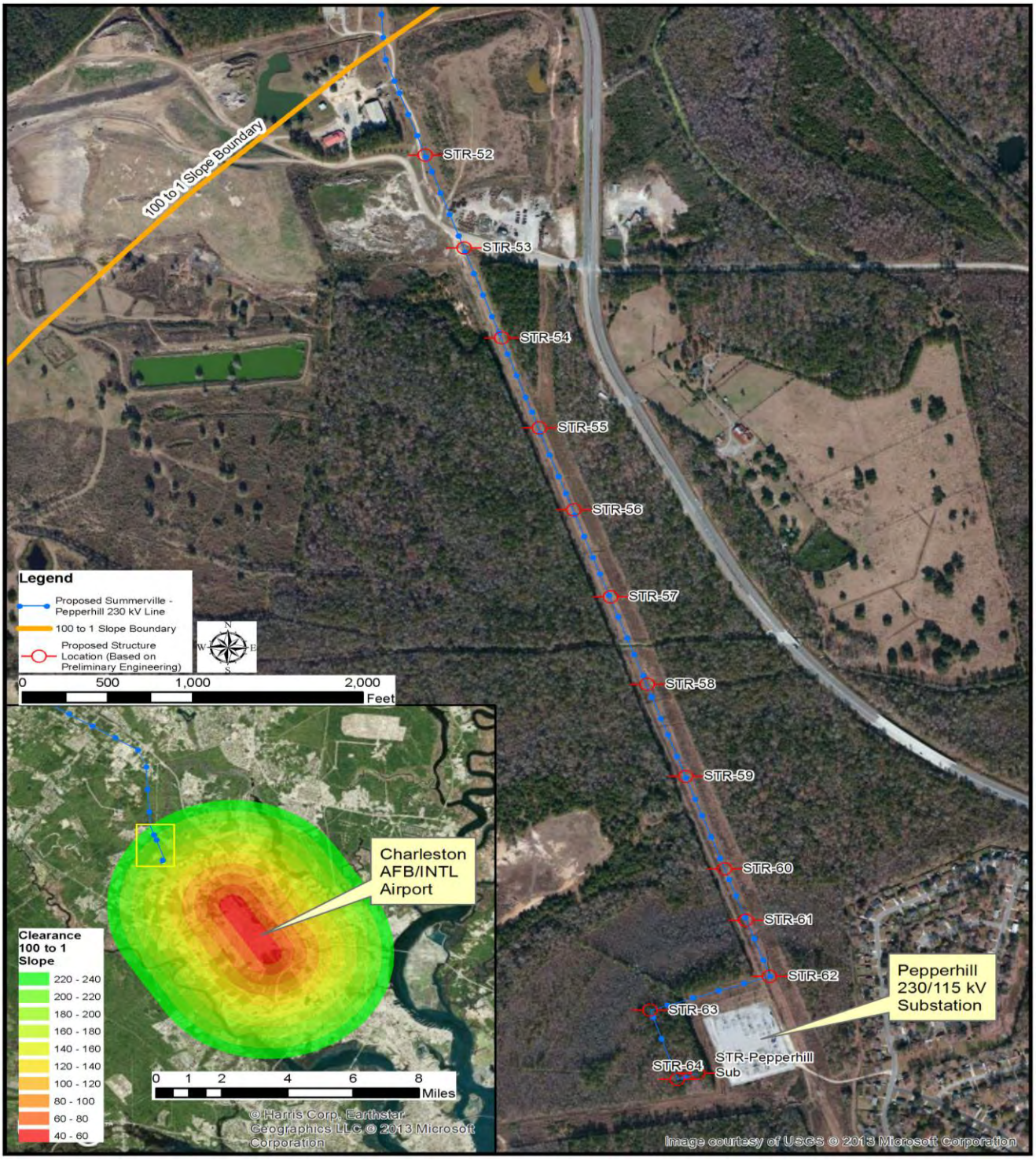
Pursuant to these notification triggers, SCE&G identified one aviation facility, the Charleston International Airport/Charleston Air Force Base, in the vicinity of the proposed Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment (*Figure 5.12-A*). Because of the Lines' proximity to the aviation facility (approximately 13,500-feet at the closest point from the northern end of the 9,000-foot runway) the Pepperhill - Summerville 230 kV Line and Williams - Pepperhill Line Segment will require FAA notification. However, the Lines will pose no hazards to aviation because an analysis of the Lines, based on preliminary engineering and analysis of ground to controlled airspace surface clearances, indicates that line structures will not penetrate the 100:1 controlled airspace surface as illustrated in Chart 5.12-1 and Figure 5.12-1.

Chart 5.12-1: Analysis of Transmission Structures within the 100:1 Controlled Airspace of Charleston International Airport / Charleston Air Force Base

Structure Number	Structure Location (X Coordinate)	Structure Location (Y Coordinate)	Ground Elevation at the Structure Base	Planned Structure Height	Ground Clearance at the Structure to the 100:1 Controlled Airspace Surface
STR-52	2278721.74	409384.00	42.53	135.00	188.68
STR-53	2278950.68	408736.54	45.04	100.00	185.12
STR-54	2279173.11	408107.48	22.22	90.00	198.09
STR-55	2279394.42	407481.59	13.32	85.00	200.43
STR-56	2279597.23	406908.03	11.31	85.00	195.68
STR-57	2279811.55	406301.92	10.51	85.00	190.52
STR-58	2280027.47	405691.26	10.20	85.00	184.27
STR-59	2280254.18	405050.11	15.90	85.00	171.88
STR-60	2280482.35	404404.82	10.76	85.00	171.97
STR-61	2280609.03	404046.56	10.65	95.00	169.90
STR-62	2280747.78	403654.18	14.29	110.00	166.76
STR-63	2280044.15	403417.51	10.63	115.00	169.82
STR-64	2280203.00	402933.98	14.01	95.00	164.18
STR at Pepperhill Substation	2280323.17	402978.52	14.01	60.00	162.71

Note: This analysis includes only Pepperhill - Summerville 230 kV Line structures for which preliminary engineering has been completed. Because the ground clearance at the Pepperhill Substation to the 100:1 controlled airspace surface is in excess of 160', SCE&G determined that Williams - Pepperhill Line Segment structures, which will be in the approximate height range of 100' to 120', with the possible exception of one structure being approximately 135' high, will be well below the controlled airspace surface.

Figure 5.12-1: Proposed Pepperhill - Summerville Line Structures within the 100:1 Controlled Airspace of Charleston International Airport/Charleston Air Force Base



SCE&G has determined that aviation/controlled airspace will not be affected by the Pepperhill - Summerville 230 kV Line or the Williams - Pepperhill Line Segment. However, upon completion of line engineering SCE&G will submit FAA Form 7460-1 to the FAA for each

transmission line structure within 20,000 feet of the nearest point on the Charleston International Airport/Charleston Air Force Base runway as required by federal regulations (Title 14-Chapter 1-Subchapter E-Part 77).

5.13 Noise, Radio, and Television Interference

When a substation or transmission line is in operation, an electric field is generated in the air surrounding the current-carrying conductors. This electric field allows corona to occur, and this corona can create an audible noise. Corona is the partial electrical breakdown of the insulating properties of the air in the vicinity of the conductors of a transmission line. When the intensity of the electric field at the conductor surface exceeds the breakdown strength of the surrounding air, a corona discharge occurs at the conductor surface. Energy and heat are dissipated in very small volumes near the surface of the conductors. Part of this energy is in the form of small local pressure changes that result in audible noise.

Corona-generated audible noise can be characterized as a hissing, cracking sound which, under certain conditions, is accompanied by a 120-hertz (Hz) hum. Corona-generated audible noise is of concern primarily for electrical lines and equipment that are operated at 230 kV and higher during inclement weather conditions. The conductors of high voltage transmission lines are designed to be corona-free under ideal conditions. However, slight variations and irregularities in the conductor surface can cause distorted electric fields near the conductor surface, and the occurrence of corona. The most common source of distorted electric fields at the conductor surface is water droplets on, or dripping from, the conductors. Therefore, audible noise from high-voltage transmission lines and substations is generally associated with, and enhanced by, wet weather (i.e., wet conductor) phenomenon, which can occur during periods of rain, fog, snow or icing. These conditions are expected to occur infrequently and will usually be limited to a “hissing” sound that will be 40 dB or less (40 dB is comparable to a quiet library). During fair weather, insects and other contaminants on current carrying conductors can also serve as sources of corona.

Corona current carrying conductors can also generate electromagnetic interference for radio and television receivers. Corona generated interference is localized and rarely noticeable outside the transmission line rights-of-way or beyond the immediate vicinity of substations.

Another type of radio and television interference, known as gap-type noise, is caused by an oxidized film at the point of contact between two metallic electric hardware pieces. The film acts as an insulator between the surfaces and small electric sparks, which produce noise and interference. Gap type interference normally causes radio or television interference within a mile or less of the source and can be corrected by eliminating the source.

SCE&G's construction and maintenance practices will ensure proper connections of current carrying equipment throughout the operational life of the Summerville–Pepperhill 230 kV Line and Williams - Pepperhill Line Segment; therefore, no adverse audible noise or radio and television interference effects are expected to be associated with the lines' operation.

5.14 Safety

To provide for public safety and protection, SCE&G will design and construct the Summerville–Pepperhill 230 kV Line and Williams - Pepperhill Line Segment in a manner that will comply with, or exceed, the latest standards of the National Electrical Safety Code in effect at the time of design. SCE&G commits to continue their long-standing tradition of operating and maintaining their facilities in a manner that will ensure public safety over the life of the facilities.

5.15 Electric and Magnetic Fields

Electric and magnetic fields ("EMF") exist anywhere there is electricity, whether that electricity is being produced, distributed, or consumed. Thus, EMF is created by power lines, residential wiring, appliances, and even by the earth itself. Since the early 1970's, hundreds of studies have debated the possible health effects of EMF. In 1996, the National Academy of Sciences ("NAS"), National Research Council, completed its review of the literature on the possible health risks of residential exposure to power-frequency electric and magnetic fields. In 1999, the National Institute of Environmental Health Sciences ("NIEHS") completed a comprehensive program of research and analysis to clarify the potential health risks from exposure to extremely low frequency electric and magnetic fields.

The NAS report stated, *"Based on a comprehensive evaluation of published studies relating to the effects of power frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard."* The NAS went on to say, *"No conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."*

NIEHS concluded that the evidence for a risk of cancer and other human disease from the electric and magnetic fields around power lines is "weak." The NIEHS stated that *"the results of the EMF-RAPID program do not support the contention that the use of electricity poses a major unrecognized public-health danger."* NIEHS Director Kenneth Olden, Ph.D., said, *"The lack of consistent, positive findings in animal or mechanistic studies weakens the belief that this association is actually due to EMF, but it cannot completely discount the epidemiological findings. For that reason, and because virtually everyone in the United States is routinely exposed to EMF, efforts to*

encourage reductions in exposure should continue."

EMF levels drop sharply with increased distance from a power source. SCE&G has published information listing the typical 60 hertz magnetic field levels associated with 115 kV lines. Directly under the line, the range is 2.1-19.3 milliGauss (mG); at the edge of the right-of-way, the range is 0.6-3.4 mG; 50' from the edge of the right-of-way, the range is 0.3-1.9 mG. This data is the same as published by Duke Energy Corporation with respect to 100 kV lines. Moreover, Duke Energy publishes the following information shown in Chart 5.15-1 regarding 230 kV Lines (SCE&G has not published similar data for 230 kV lines):

Chart 5.15-1: Typical EMF Levels Associated with 230 kV Lines

Location	Typical EMF Level Range
Under the Line	4.5-29.0 mG
Edge of Right-Of-Way	1.9-6.4 mG
50' From Edge of Right-Of-Way	1.0-3.5 mG

Generally, the normal background magnetic field strength levels away from electrical devices are 0.6-1.5 mG. In homes, typical daily magnetic field strength levels around common electrical devices and appliances are higher. Chart 5.15-2 shows typical magnetic field strength ranges for certain appliances as published by SCE&G and Duke Energy:

Chart 5.15-2: Typical EMF Levels Associated with Various Household Appliances

Appliance	Distance from the EMF Source		
	1 Inch	1 Foot	3 Feet
Microwave oven	140.0 mG	65.0 mG	10.0 mG
Refrigerator	6.0 mG	4.0 mG	1.2 mG
Electric Range	250.0 mG	25.0 mG	2.0 mG
Electric Razor	500.0 mG		
Hair Dryer	100.0 mG	30.0 mG	
Electric can opener	5,000.0 mG		
Computer terminal / TV	26.0 mG	3.4 mG	1.2 mG
Electric Clock	130.0 mG	15.5 mG	2.5 mG

5.16 Ozone

High-voltage transmission facilities may, under some conditions, produce small amounts of ozone as a consequence of corona discharge. This discharge is caused by abrasions on conductors or foreign-particle contamination of the insulators or hardware. SCE&G takes care to eliminate or minimize corona discharge from random arcing through careful design of the connections, fittings, hardware, and insulation.

Organizations such as the Illinois Institute of Technology have conducted extensive field tests under various weather conditions to detect ozone around high-voltage substations and 765 kV lines. These tests showed no significant adverse effects on plants, animals, or humans from levels of ozone that may be produced in operating transmission facilities at voltages up to 765 kV.

The Summerville–Pepperhill 230 kV Line and Williams - Pepperhill Line Segment should not produce any detectable amount of ozone under any operating condition, and thus will have no adverse effect on environmental quality.

Figures

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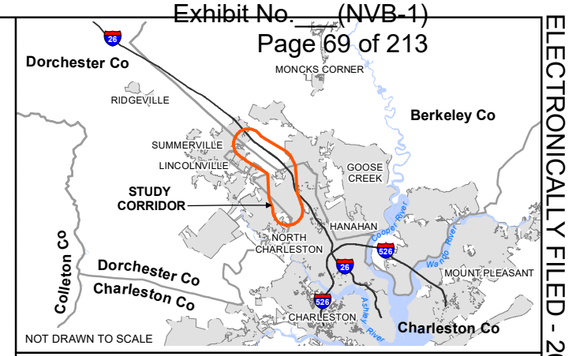
Inset 2



Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Route Corridor

0 4,000 8,000 Feet

Source: USGS 7.5' Quadrangle Map (USDA quad mosaic, Charleston County, SC)

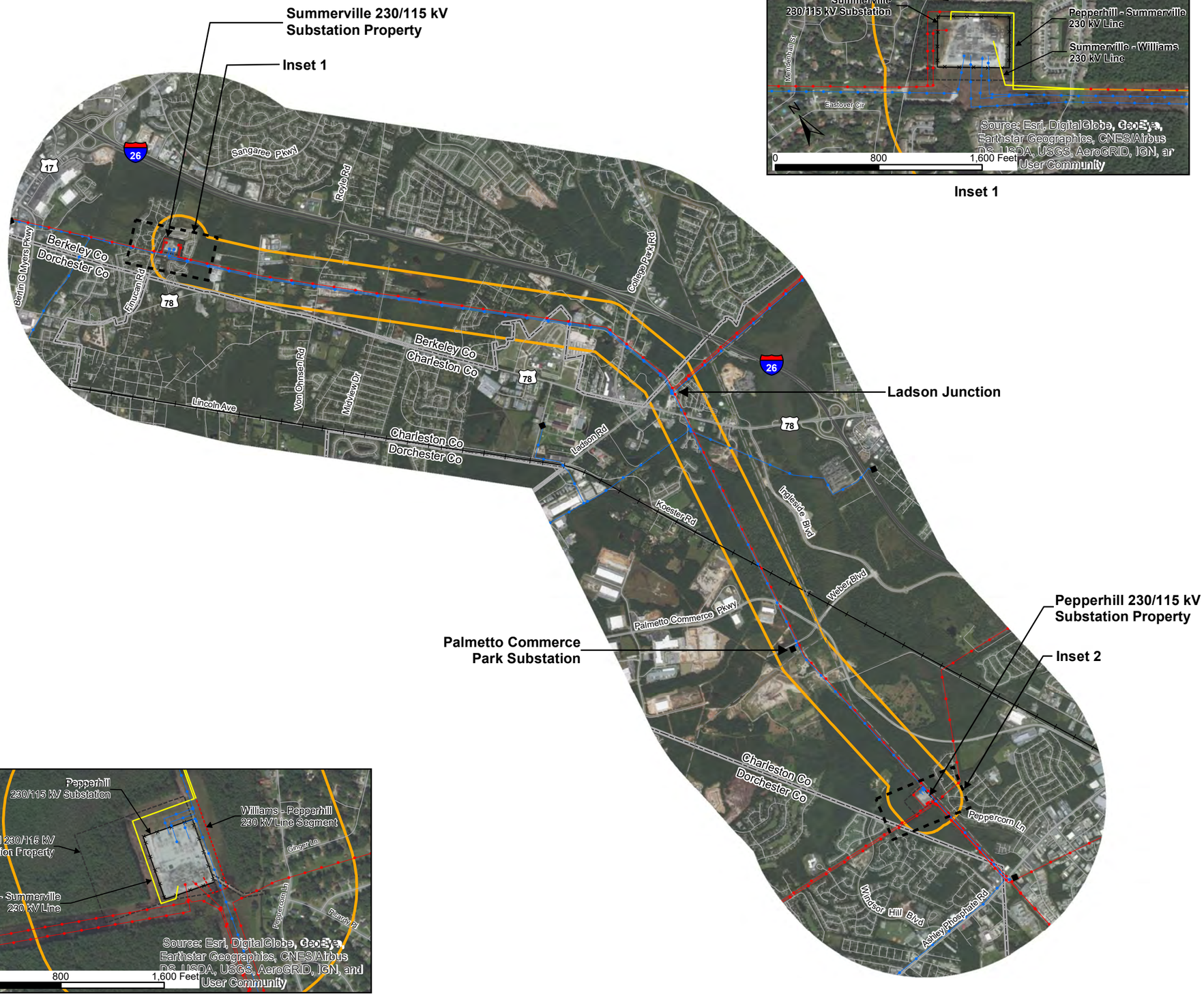
USGS Quadrangle Map

Pepperhill - Summerville 230 kV Line
and
Williams - Pepperhill 230 kV Line Segment

Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 4.0-A



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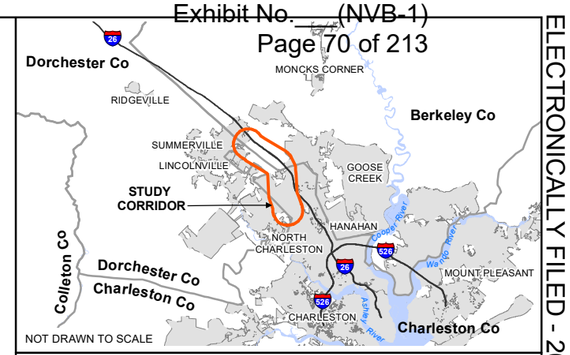


Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Route Corridor

0 4,000 8,000 Feet

Source: 2016 Aerial Imagery Basemap (Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community)

Aerial Photography

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

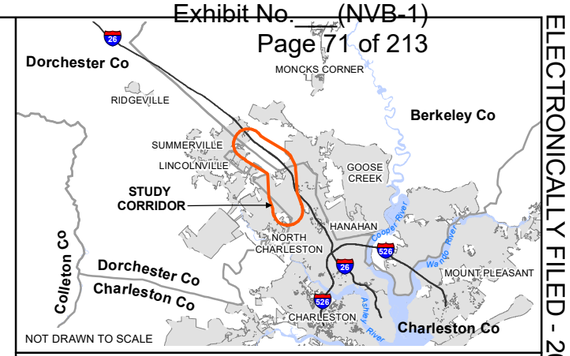
Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 4.0-B

Inset 1

Inset 2



Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Study Corridor
- Auto Salvage
- Equestrian Facility
- Utility - Communication
- Campground
- Cemetery
- Communication Tower
- Electric Power Facility
- Electrical Transmission Right-of-Way - Santee Cooper
- Electrical Transmission Right-of-Way - South Carolina Electric and Gas
- Fairground
- Government
- Landfill
- Place of Worship
- Railroad Right-of-Way
- Recreation
- Road Right-of-Way
- SCE&G Property
- Utility - Gas Pipeline Facility
- No Designated Land Use

0 4,000 8,000 Feet

Source: Berkeley and Charleston Counties, SC Tax Parcel Information and Field Reconnaissance

Land Use

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

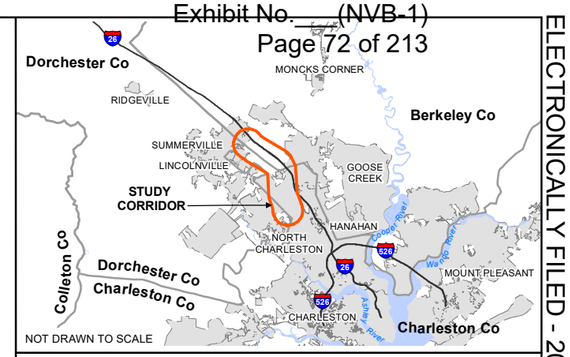
Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 5.1-A

Inset 1

Inset 2



Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Route Corridor
- Study Corridor
- Church
- Commercial
- Community
- Government
- Light Industrial
- Multi-family Residence
- Recreation
- Single Family Residence

0 4,000 8,000 Feet

Source: Field Reconnaissance

Occupied Buildings

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

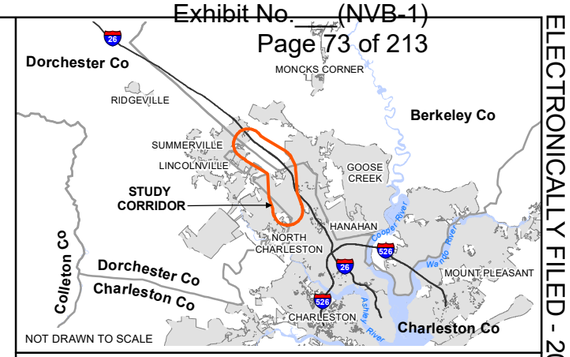
Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 5.1-B

Inset 1

Inset 2



Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Study Corridor
- Prime farmland
- Farmland of statewide importance
- Prime farmland if drained
- Not prime or important farmland

N

0 4,000 8,000 Feet

Source: United States Department of Agriculture, Natural Resources Conservation Service

Prime Farmland and Soils of Statewide Importance

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
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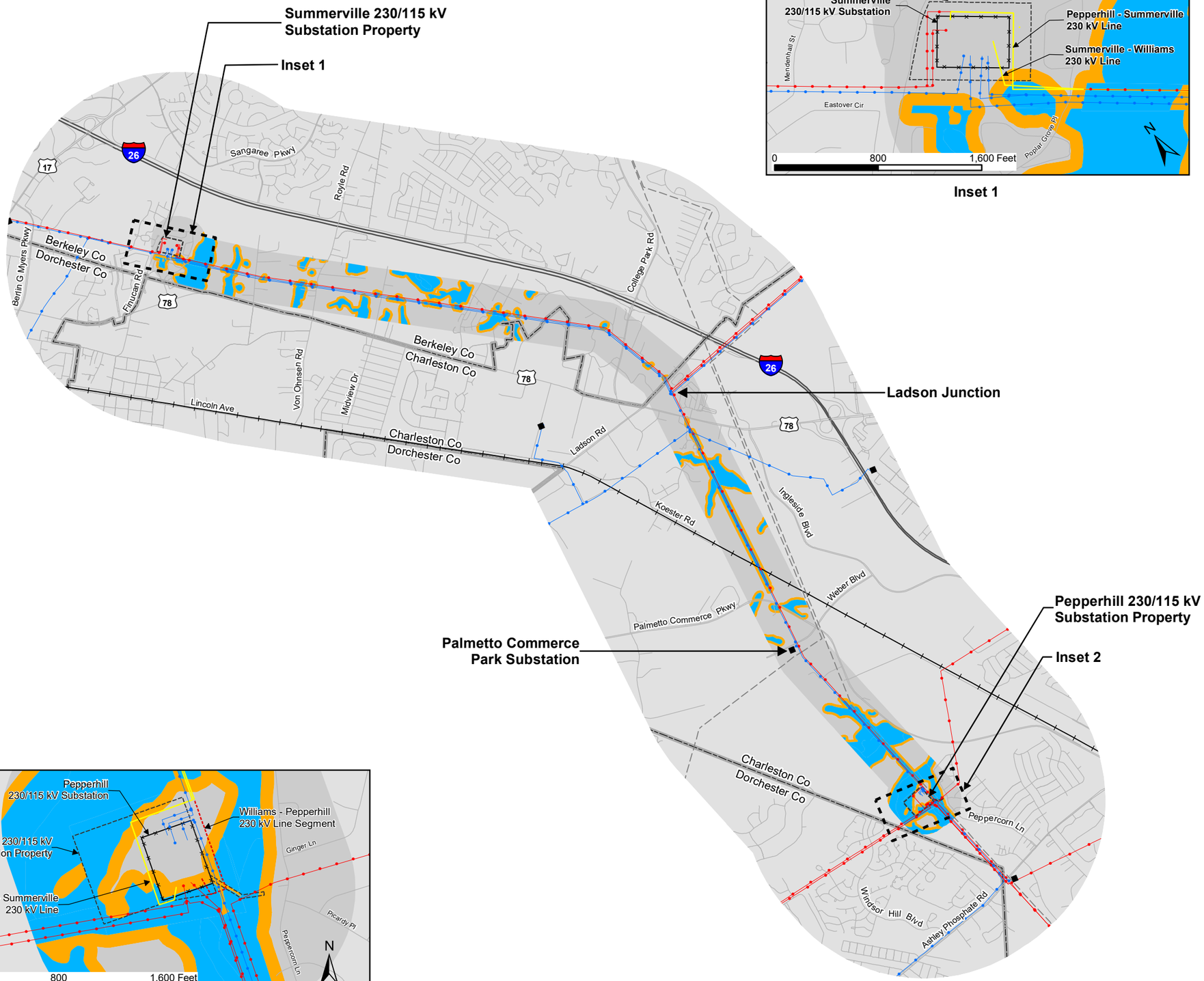
FIGURE 5.3-A



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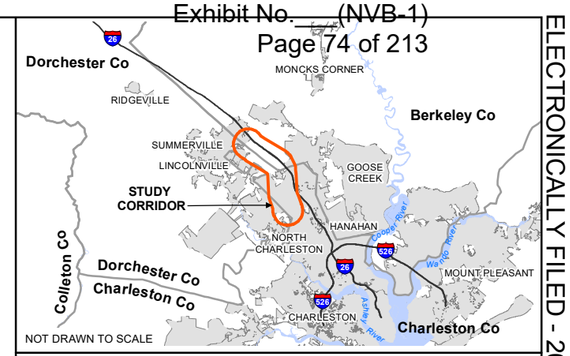


Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Study Corridor
- Wetland
- 100' Buffer
- Upland

N

0 4,000 8,000 Feet

Source: Palmetto Environmental Consulting, Inc. and U.S. Fish and Wildlife Service (National Wetlands Inventory)

Wetlands

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

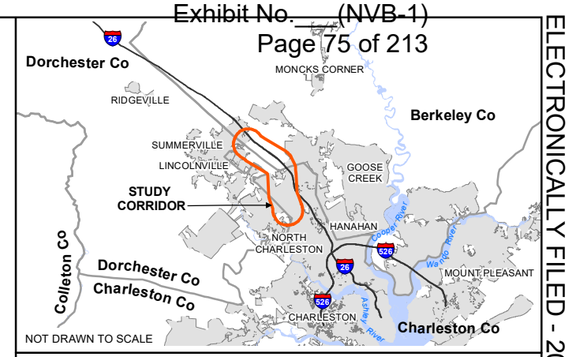
Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 5.4-A

Inset 1

Inset 2



Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Stream
- Study Corridor
- Lake / Pond
- 100' Buffer
- Upland

N

0 4,000 8,000 Feet

Source: Palmetto Environmental Consulting, Inc., USGS Digital Line Graphs, and 2016-2017 Aerial Photography

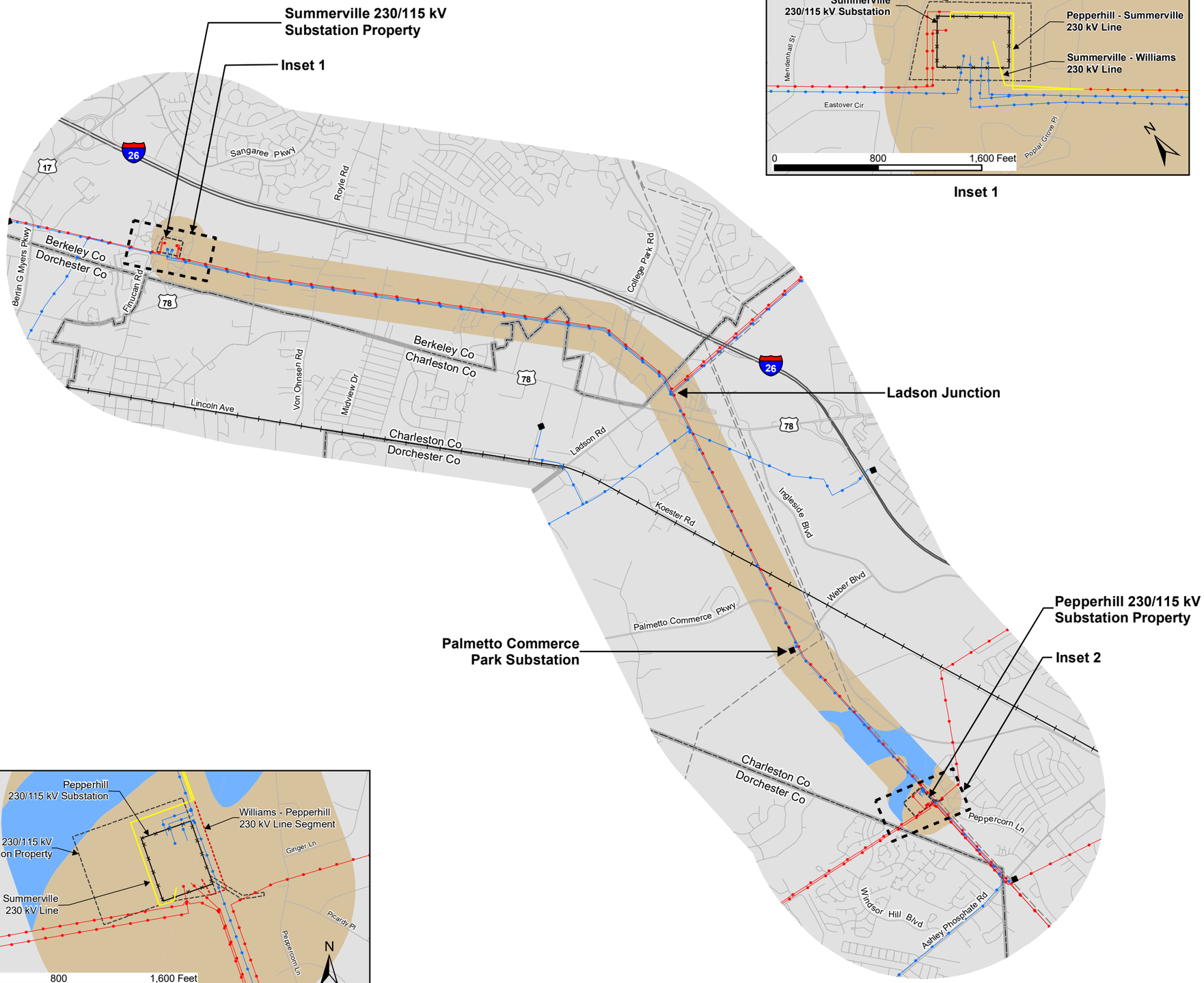
Hydrography

Pepperhill - Summerville 230 kV Line
and
Williams - Pepperhill 230 kV Line Segment

Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 5.4-B



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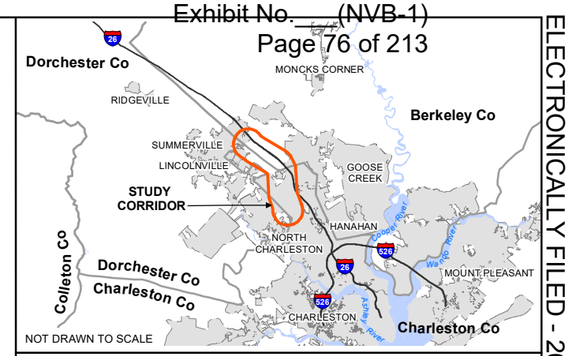


Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Study Corridor
- Zone A - Areas of 100-Year Flood (No Flood Elevations Determined)
- Zone X - Areas Determined to be Outside 500-Year Flood Plain

N W E S

0 4,000 8,000 Feet

Source: Federal Emergency Management Agency

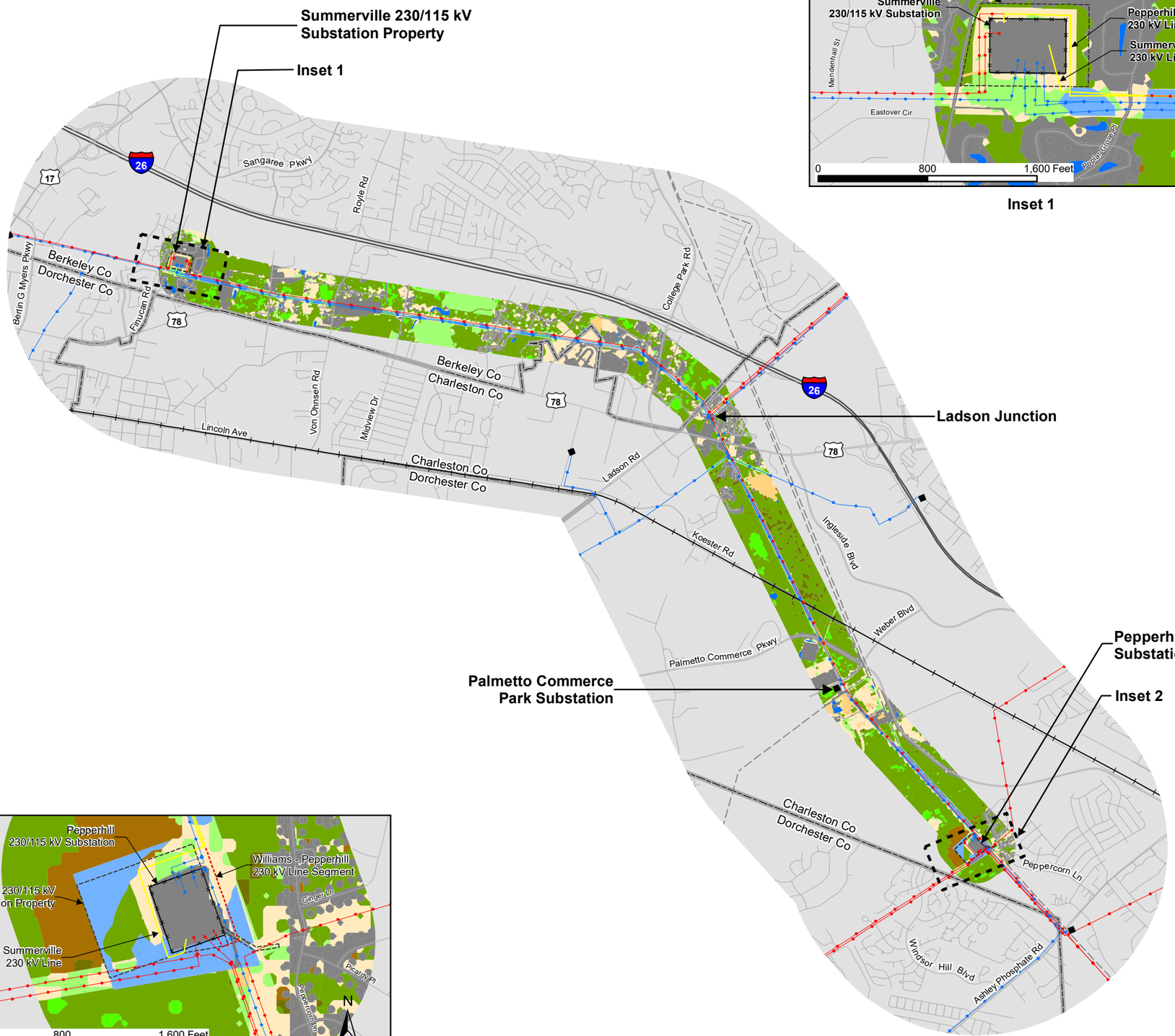
FEMA Flood Zones

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

Berkeley, Charleston, and Dorchester Counties, SC

SCE&G A SCANA COMPANY

FIGURE 5.5-A



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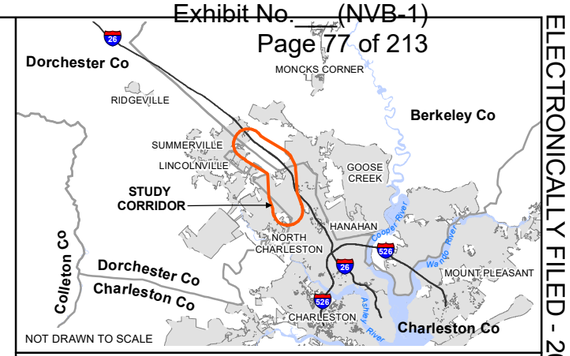


Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Barren
- Bottomland/Flood Plain/Hardwood Forest
- Grass/Pasture
- Hardwood Forest
- Mixed Hardwood/Pine Forest
- Pine Forest
- Scrub/Shrub
- Urban/Built-up
- Water
- Wetland
- Study Corridor

0 4,000 8,000 Feet

Source: 2014 Satellite Image (Landsat), 2016-2018 Aerial Photography, Field Reconnaissance, and Palmetto Environmental Consulting, Inc.

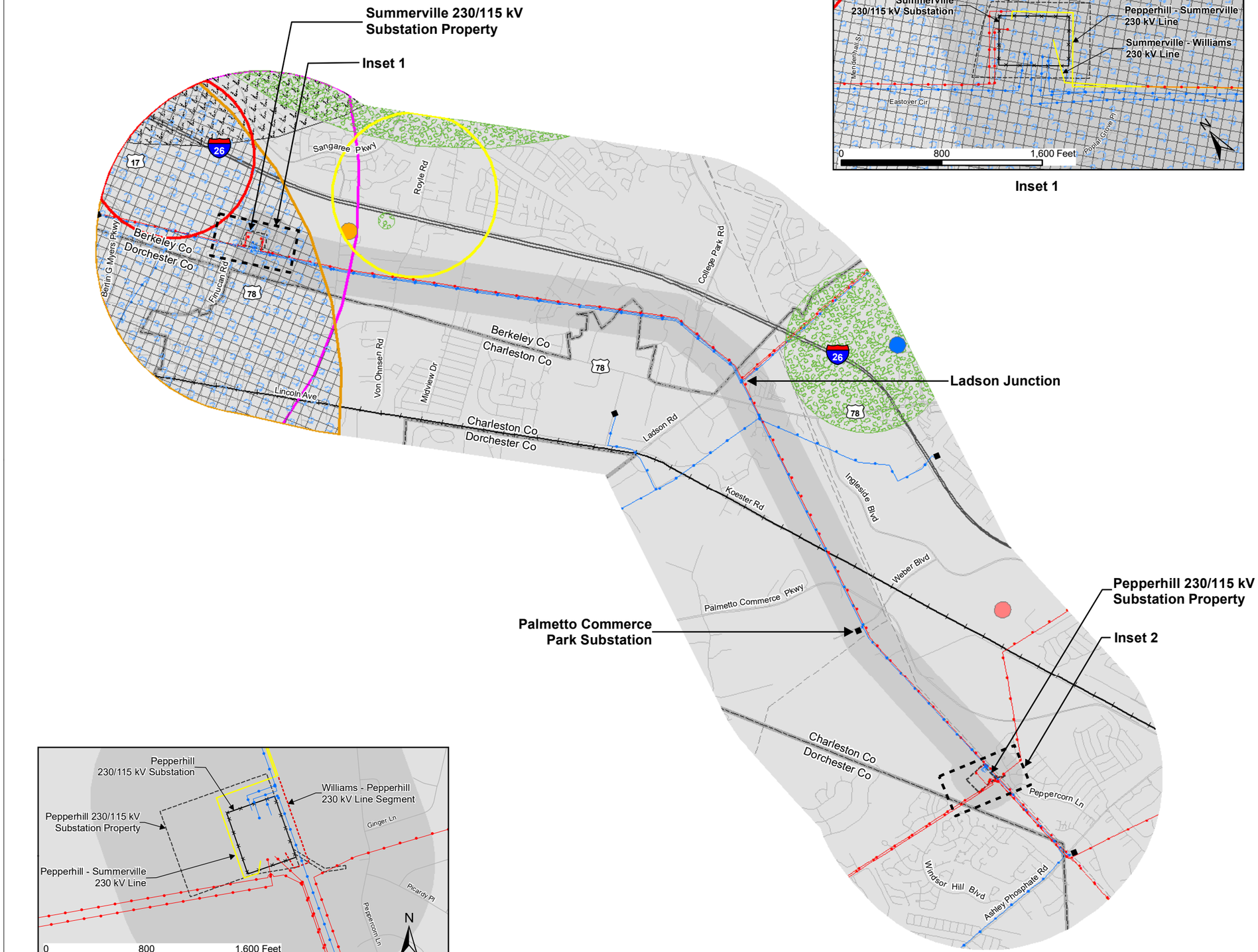
Land Cover

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

Berkeley, Charleston, and Dorchester Counties, SC

SCE&G A SCANA COMPANY

FIGURE 5.6-A



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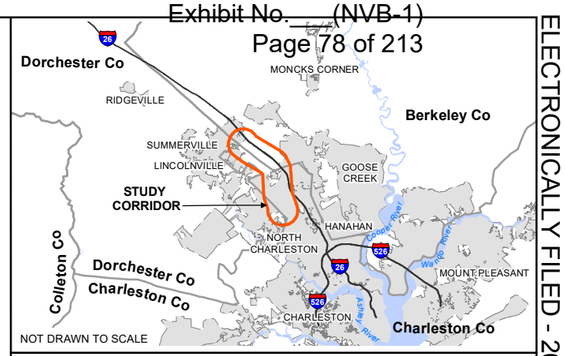


Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Route Corridor
- Study Corridor
- Eastern Woodrat
- Bog Asphodel
- Crestless Plume Orchid
- Gopher Frog
- Green-fringe Orchid
- Least Tern
- Pineland Plantain
- Rafinesque's Big-eared Bat
- Scarlet Indian-paintbrush
- Waterbird Colony
- Yellow Fringeless Orchid

0 4,000 8,000 Feet

Source: South Carolina Department of Natural Resources (Heritage Trust Program) and Palmetto Environmental Consulting, Inc.

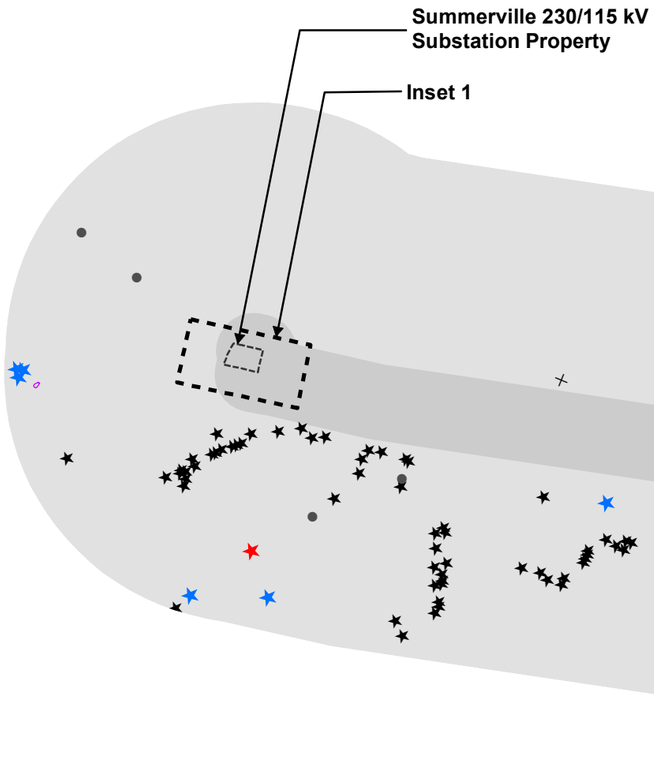
Natural Resources

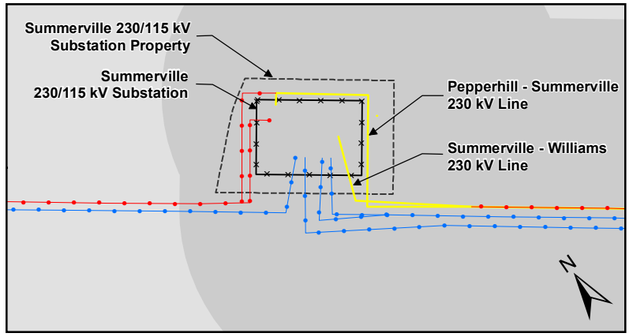
Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 5.8-A





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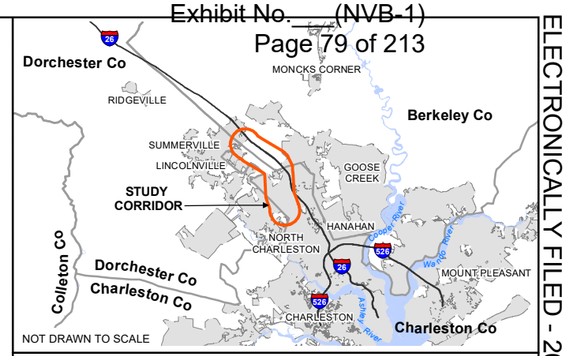
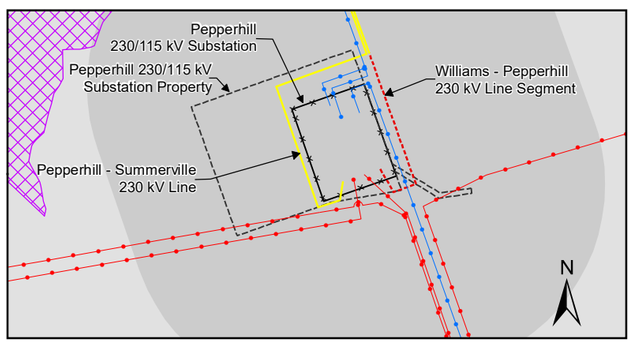


Legend

- Route Corridor
- Study Corridor
- Historic Site - Eligible for the National Register
- Historic Site - Eligible for the National Register (Cemetery)
- Historic Site - Potentially Eligible for the National Register
- Historic Site - Not Eligible for the National Register
- Historic Site - Not Eligible for the National Register (Cemetery)
- Historic Site - Not Eligible for the National Register (Demolished)
- Archaeological Site

0 4,000 8,000 Feet

Source: Brockington and Associates, Inc. (South Carolina Department of Archives and History and South Carolina Institute of Archaeology and Anthropology) and Field Reconnaissance (Brockington and Associates, Inc.)



Inset 2

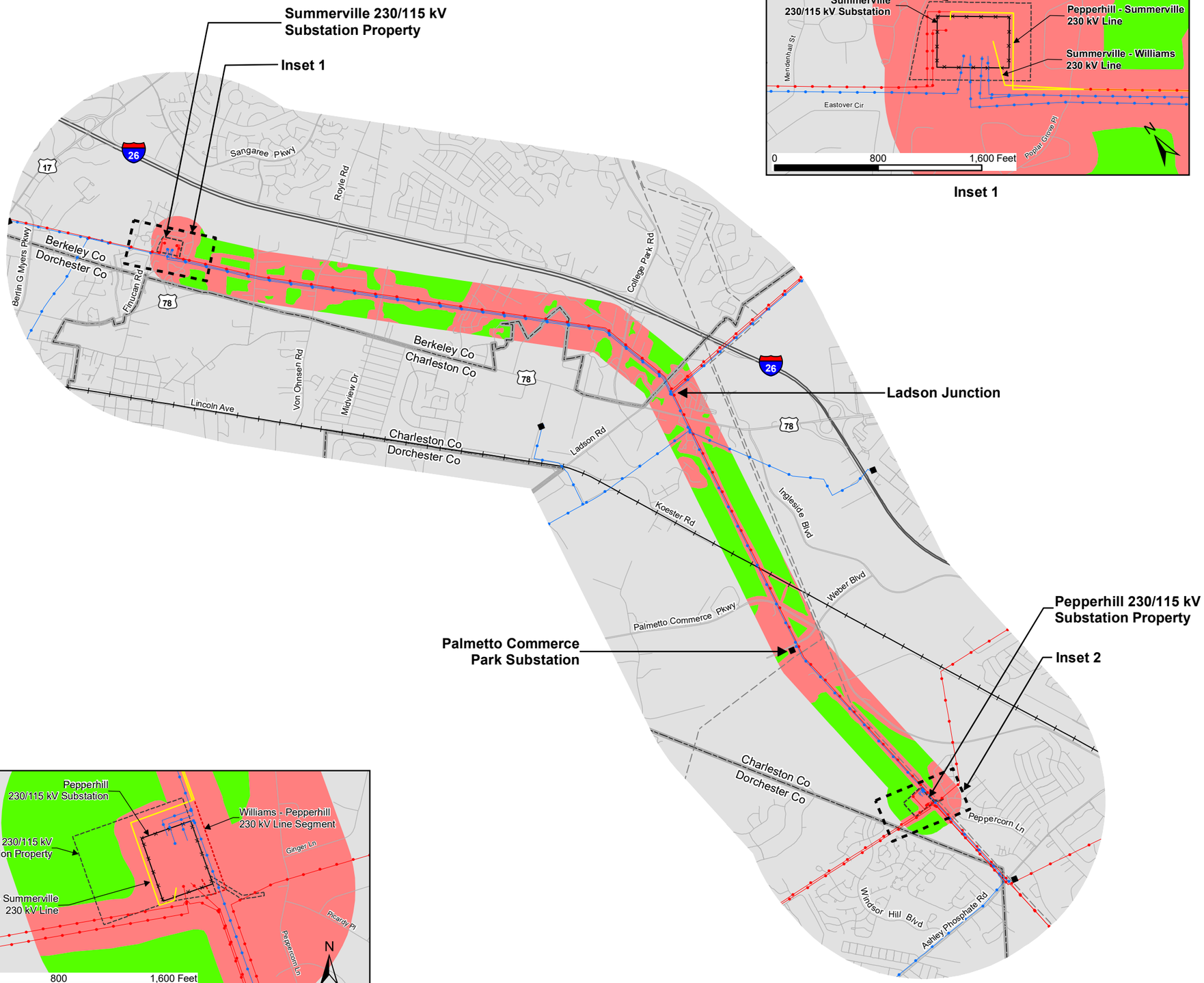
Cultural Resources

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 5.9-A



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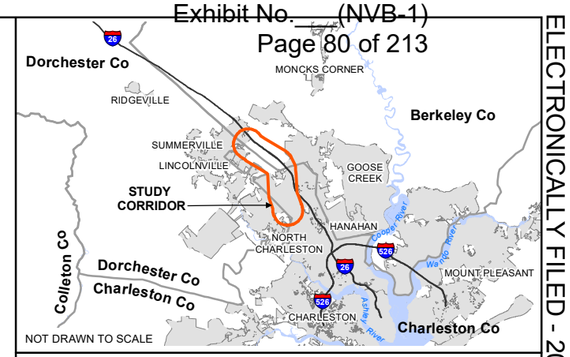


Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Study Corridor
- Visible from a Public Road
- Not Visible from a Public Road

N

0 4,000 8,000 Feet

Source: Field Reconnaissance

Visibility from Roads

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

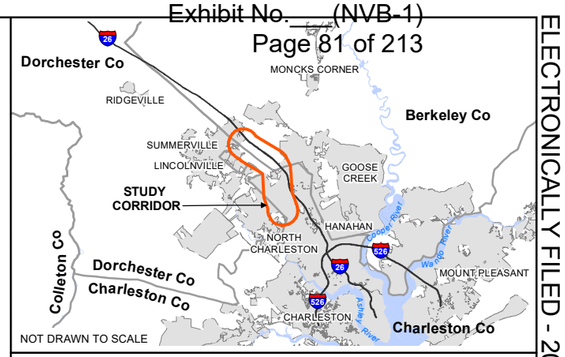
Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 5.10-A

Inset 1

Inset 2



Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Study Corridor
- < 0.25 Acres per Person
- 0.25 - 0.5 Acres per Person
- 0.51 - 1.0 Acres per Person
- 1.1 - 2.0 Acres per Person
- 2.1 - 4.0 Acres per Person
- 4.1 - 10.0 Acres per Person
- > 10 Acres per Person

0 4,000 8,000 Feet

Source: 2010 US Census Bureau

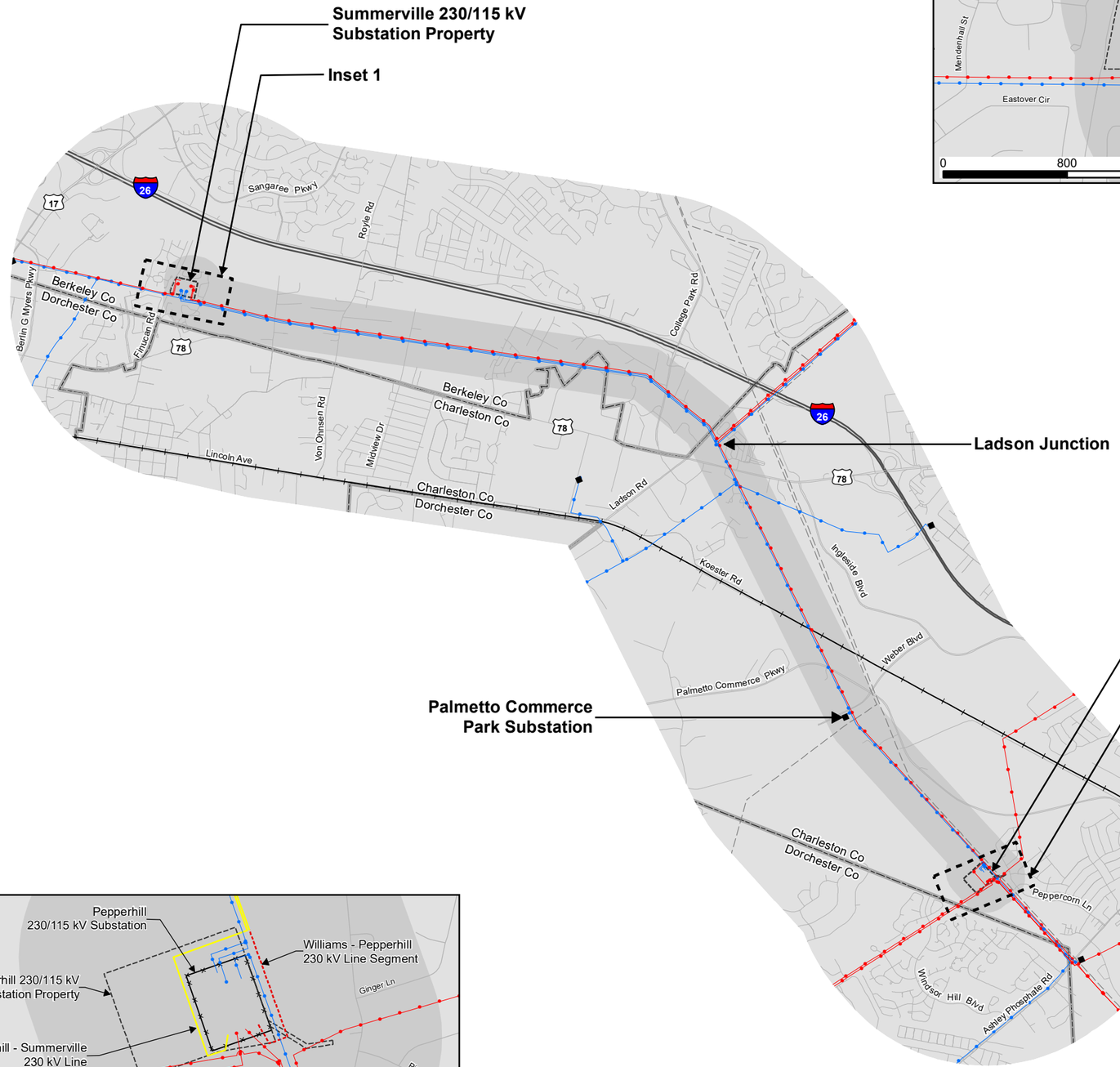
Population Density

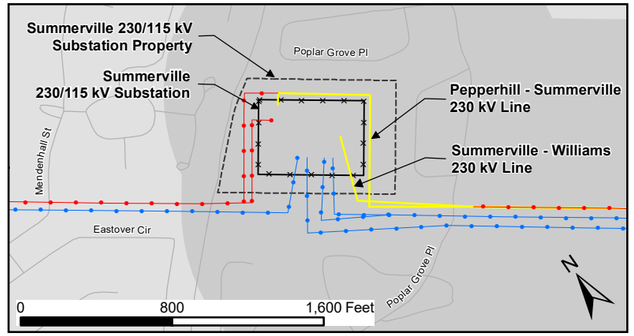
Pepperhill - Summerville 230 kV Line
and
Williams - Pepperhill 230 kV Line Segment

Berkeley, Charleston, and Dorchester Counties, SC

SCE&G
A SCANA COMPANY

FIGURE 5.11-A





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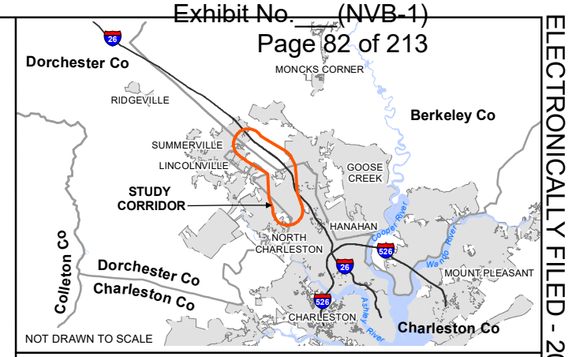

Legend

- SCE&G Substation
- Road
- Interstate Highway
- Railroad
- County Line
- SCE&G 115 kV Transmission Line
- SCE&G 230 kV Transmission Line
- Santee Cooper Transmission Line
- Route Corridor
- Study Corridor
- Airport

0 4,500 9,000 Feet

Source: Federal Aviation Administration (FAA), and National Transportation Atlas Database

Aviation Facilities

Pepperhill - Summerville 230 kV Line and Williams - Pepperhill 230 kV Line Segment

Berkeley, Charleston, and Dorchester Counties, SC

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FIGURE 5.12-A

APPENDIX A

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APPENDIX B

BIOLOGICAL ASSESSMENT REPORT

Federally-Listed Threatened and Endangered Species/State Rare, Threatened, and Endangered Species Assessment and Jurisdictional Waters/Wetlands Assessment for the Proposed Pepperhill – Summerville 230kV Line and Williams – Pepperhill Line Segment, Berkeley and Charleston Counties, South Carolina

Prepared for:

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Fort Mill, South Carolina 29715

Prepared by:

Palmetto Environmental Consulting, Inc
Post Office Box 1730
Lexington, South Carolina 29071

April 27, 2012
Revised April 19, 2018

Introduction

In early 2012, UC Synergetic, LLC (UCS, Pike Energy Solutions at that time) contracted Palmetto Environmental Consulting, Inc. (PEC) to conduct an assessment for federally-listed threatened and endangered species, and state-listed rare, threatened and endangered (T&E) species assessment on an approximately 169-acre, 7.8-mile long transmission line corridor, which includes an approximately five-acre existing substation (Project Area) located near Summerville, South Carolina (Appendix C, Figures 1a, 1b, and 1c). The Project Area is an existing transmission line corridor that varies in width between 125 and 200 feet and an approximately five-acre parcel that encompasses an existing substation located on the south end of the transmission line corridor. The on-site assessment also consisted of delineating any jurisdictional waters/wetlands located in the Project Area. In April 2018, UCS contracted PEC to perform an update (field investigation and report) of the 2012 T&E species assessment; this report is inclusive of the 2012 and the 2018 T&E investigations. The field investigation update was conducted in mid-April 2018.

The purpose of this report is to provide the results of the federal and state protected species/species of concern assessment and a brief description of jurisdictional waters/wetlands located in the Project Area. For purposes of the species assessment, PEC addresses only those species listed by the United States Fish and Wildlife Service (USFWS) as federally threatened or endangered and those listed by the South Carolina Department of Natural Resources (SCDNR) as state endangered or threatened. Of the species listed by SCDNR as S1 (critically imperiled state-wide because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation), S2 (imperiled state-wide because of rarity or factor(s) making it vulnerable), or S3 (rare or uncommon in state), PEC notes in this report only those for which appropriate habitat was observed within the Project Area. Representative photos of the Project Area are presented at the end of this report in Appendix B, and their locations are shown on the attached Figure 2 of Appendix C.

Site Description and Jurisdictional Waters

Between April 3 and 11, 2012, PEC conducted a jurisdictional waters/wetlands delineation within the Project Area. During the delineation, orange "Wetland Delineation" surveyor tape was placed at regular intervals along the wetland boundary, and the location of each wetland flag was GPSed with a Trimble GeoXT unit. A drawing was created depicting the approximate boundaries of jurisdictional waters and wetlands within the Project Area (approximately 54.4 acres of wetlands and approximately 295 linear feet [0.10 acre] of stream, Figures 1a, 1b, and 1c). The delineation performed by PEC was verified by the US Army Corps of Engineers (USACE) in late 2014 and a Jurisdictional Determination letter was subsequently issued dated January 28, 2015 (SAC 2014-01010-2JY).

The transmission line ROW appears to be regularly maintained, as only herbaceous species are present. Field investigations indicated the ROW had been cut in the previous few months. Wetlands south of US Highway 78 are few but extensive and contiguous, while wetlands north of US Highway 78 are many and smaller in size. Wetland vegetation consists predominantly of bushy bluestem (*Andropogon glomeratus*), plume grass (*Erianthus contortus*), dogfennel (*Eupatorium capillifolium*), giant cane (*Arundinaria gigantea*), cinnamon fern (*Osmunda cinnamomea*), netted chain fern (*Woodwardia areolata*), dogfennel (*Eupatorium capillifolium*), common rush *(Juncus effusus*), henbit (*Lamium amplexicaule*), common sheep sorrel (*Rumex acetosella*), geranium (*Geranium carolinianum*), and various sedges (*Carex* sp.) and grasses. Few vines were observed; those observed consisted of muscadine (*Vitis rotudifolia*), roundleaf greenbrier (*Smilax rotundifolia*), and laurel greenbrier (*Smilax laurifolia*).

Protected Species Literature and Records Search

PEC personnel conducted a protected species literature and records search on April 2, 2012 to determine the presence of known occurrences of federally- and state-listed animal and plant species on or within a one-mile radius of the Project Area. The literature and records search from 2012 included review of the following resources:

- The USFWS South Carolina Distribution Records of Endangered, Threatened, Candidate and Species of Concern, updated May 2011;

- The South Carolina Department of Natural Resources' (SCDNR) South Carolina Rare, Threatened, & Endangered Species Inventory database (updated January 17, 2006) for the Ladson, Summerville, and Mount Holly quadrangles; and
- The SCDNR Heritage Trust Program's Rare, Threatened, and Endangered Species Database GIS layer [SC_StatewideEOs.lyr], updated January 13, 2012.

The 2012 literature and records search revealed one known occurrence of least tern (*Sterna antillarum*), two occurrences of yellow fringeless orchid (*Platanthera integra*), one occurrence of green fringe orchid (*P. lacera*), one occurrence of crestless plume orchid (*Pteroglossapis ecristata*), and one occurrence of scarlet Indian-paintbrush (*Castilleja coccinea*) within one mile of the Project Area. All of these species were state-listed; none were federally-listed.

Since the 2012 literature and records search, SCDNR has developed and made available the Rare, Threatened, and Endangered Species in South Carolina (June 2017) website. The release of the website has made the January 2006 database and GIS layer referenced above obsolete. According to the website, the known occurrences within one mile of the Project Area are the same as they were in the 2012 literature and records search; the only difference is the 2012 search listed one occurrence of least tern within the search radius whereas the 2017 website lists "waterbird colony." It is likely these are the same occurrences.

One hundred forty-three (143) species of federally- and state-listed plants and animals either occur or potentially occur in Berkeley and Charleston counties. These species, as well as the results of the literature and records search, are summarized in Appendix A, Table 1. Because of the large number of species listed in the two project counties, this report will address only those species for which appropriate habitat was located within the Project Area.

Species Descriptions and Results

ANIMALS

Bachman's sparrow (*Aimophila aestivalis*)

Bachman's sparrow occupies open pine woods with a grassy floor but can sometimes use oak-palmetto scrub and open spaces that are in transition to forest (replanted clearcuts, powerline cuts, and abandoned fields). Important understory components for this species include grasses (wiregrass, panic grass, little blue stem, broom sedge), palmetto, leaf litter, and open ground. Frequent and brief natural fire maintains this habitat best. Even fairly small patches (seven to 140 acres) of suitable habitat may be occupied. It is listed by SCDNR as S3.

Spotted turtle (*Clemmys guttata*)

The spotted turtle is a semi-aquatic species that inhabits a variety of wetland types including small ponds, small streams, swamps, flooded forests and other shallow bodies of water (Conant and Collins 1991; Martof *et al*. 1980; Ernst and Barbour 1989). It is listed by SCDNR as State Threatened. This species was not observed during field investigations.

Star-nosed mole (*Condylura cristata*)

The coastal and sandhills habitats for star-nosed moles include pocosins, wetlands, saturated bottomlands, and long-leaf pine habitat. It is listed by SCDNR as rare or uncommon in the state (S3).

Eastern diamondback rattlesnake (*Crotalus adamanteus*)

Eastern diamondbacks spend most of their time coiled in palmetto thickets or other thick vegetation to ambush prey. Most movement between locations occurs during the day and is mostly restricted to the morning and evening in summer. Diamondbacks spend the winter in stump holes or tortoise burrows but may emerge on warm winter days to bask. This species feeds almost exclusively on mammals, particularly rabbits. This species is listed by SCDNR as S3.

American swallow-tailed kite (*Elanoides fortificatus*)
The kite is closely associated with large tracts of forested wetlands such as those found at the Francis Marion National Forest and along the lower Savannah, Edisto, Santee, and Great Pee Dee rivers. It shows a strong preference for nesting in dominant or codominant loblolly pines (*Pinus taeda*) growing within or on the edges of wetland forests. However, kites will regularly use bald cypress (*Taxodium distichum*) when pines are unavailable. Kites have also been recorded nesting in water tupelo (*Nyssa aquatica*), sweetgum (*Liquidamber styraciflua*) and willow oak (*Quercus phellos*). It is listed by SCDNR as State Endangered (SE). None were observed during field investigations.

Meadow vole (*Microtus pennsylvaticus*)
Meadow voles depend on grassland habitat. Apparently, density and height of grass cover are more important than food quality in determining the suitability of habitats in maintaining high, stable vole populations. SCDNR classifies meadow vole as an S3 species.

Eastern coral snake (*Micrurus fulvius*)
The eastern coral snake can be found in scattered localities in the southern Coastal Plain from North Carolina to Louisiana, including all of Florida, where they are most prevalent. They can be found in pine and scrub oak sandhills habitats in parts of their range but sometimes inhabit hardwood areas and pine flatwoods that undergo seasonal flooding. It is listed by SCDNR as an S2 species.

Eastern woodrat (*Neotoma floridana haematoreia*)
In the coastal plain, woodrats use floodplain and swamp forests, wet scrub thickets, logged areas, dry and mesic deciduous forests and hardwood pine forests. At the Naval Weapons Station near Charleston, woodrats were captured in natural pine regeneration areas that were approximately 12 years old; these areas were affected by Hurricane Hugo and contained abundant coarse woody debris. Woodrats were also captured in mature hardwood pine forest habitat and mixed stand edge with an adjoining field at the Naval Weapons Station. The eastern woodrat is listed by SCDNR as rare or uncommon in the state/apparently secure in state (S3/S4).

PLANTS
Blue maiden-cane (*Amphicarpum muehlenbergianum*)
Blue maiden-cane is primarily found in ponds, clay-based bays, wetlands and freshwater floodplains, but can occasionally be found in upland sites. It is well adapted to acid to neutral sandy soils that are wet for part of the year. It is listed by SCDNR as S2/S3.

Elliott's bluestem (*Andropogon gyrans* var. *stenophyllus*)
This species occurs in dry sandy soils of pine or oak woodlands, on roadsides, and in old fields. It usually occurs as isolated clumps mixed with other broom sedge (*Andropogon*) or bluestem (*Schizachyrium*) species. SCDNR lists it as an S1 species.

Piedmont three-awned grass (*Aristida condensata*)
This species is found in dry, sandy soils in mesic habitats. SCDNR lists it as an S2 species.

Coastal Plain water hyssop (*Bacopa cyclophylla*)
Shallow freshwater swamps, blackwater river bottomland hardwoods, or brownwater river bottomland hardwoods are the preferred habitats of coastal plain water hyssop. The species is listed by SCDNR as S1.

Winter grape-fern (*Botrychium lunarioides*)
The habitat for winter grape-fern consists of open grassy places in prairies, cemeteries, and weedy roadsides. The species is listed by SCDNR as S1.

Northern burmannia (*Burmannia biflora*)
Northern burmannia is found in low woods, pond margins, savannas, bogs, swamps, ditches, and pine barrens. It is listed by SCDNR as S2. There are no known occurrences of the species within one mile of the subject site, and none were observed during field investigations.

Bearded grass-pink (*Calopogon barbatus*)
This species is found in moist, acidic, sandy pine savannas and grasslands. It is listed by SCDNR as S2.

Many-flower grass-pink (*Calopogon multiflorus*)
Many-flowered grass-pink is located in sandy, relatively dry pine savannas and grasslands. It is listed by SCDNR as S1.

Bandana-of-the-Everglades (*Canna flaccida*)
This species is found in seasonally wet areas in open marshes, lake margins, and inundated pine flatwoods. It is listed by SCDNR as S2.

Widow sedge (*Carex basiantha*)
Widow sedge occurs on neutral or slightly acidic soils in mesic to wet mesic deciduous forests, usually on lower slopes above flood plains of rivers and streams. This species is listed by SCDNR as imperiled state wide (S2).

Chapman's sedge (*Carex chapmanii*)
Chapman's sedge is found in wet, sandy, acidic soils, sometimes over limestone, under deciduous or mixed deciduous-evergreen forests, hammocks. This species is listed by SCDNR as S1.

Ravenfoot sedge (*Carex crus-corvi*)
This species is found in seasonally saturated or inundated soils in wet meadows, marshes, swamps, alluvial bottomlands. It is listed by SCDNR as S2. There are no known occurrences of the species within one mile of the subject corridor, and none were observed during field investigations.

Cypress-knee sedge (*Carex decomposita*)
This sedge is found in marshes, swamp forests, usually on rotten stumps, floating logs, or bases of trees (often *Taxodium*) or shrubs (*Cephalanthus*) on lake, pond, and slough margins. The species is listed by SCDNR as S2.

Elliott's sedge (*Carex elliottii*)
Elliott's sedge requires acidic soil in swamp forests and forest openings, open seeps, sandy and peaty pond shores. The species is listed by SCDNR as S1.

Meadow sedge (*Carex granularis*)
Meadow sedge is a clump-forming sedge that grows to approximately 0.5 meter tall. It is usually found in wet open woodlands and forests throughout eastern North America. The species prefers partial shade/sun. Meadow sedge is listed by SCDNR as S2.

Scarlet Indian-paintbrush (*Castilleja coccina*)
This species is found in pastures, prairies, wet meadows, glades, open woods, thickets, and roadsides. It is listed by SCDNR as S2.

Ciliate-leaf tickseed (*Coreopsis integrifolia*)
This species is found in low woodlands and flood plains. It is listed by SCDNR as S1.

Stiff dogwood (*Cornus racemosa*)
Stiff dogwood can be found in part shade or sun in soils with average moisture. It occurs in open woods, woodland edges, savannas, fields, thickets, and roadsides. It is listed as an S1 species.

Venus' fly-trap (*Dionaea muscipula*)
In the Outer Coastal Plain, Venus' fly-trap occurs in broad ecotonal areas between pine savannas or wet pine flatwoods and pocosins (evergreen shrub bogs). These sites are generally flat with wet or moist soils for much of the year. The species rarely occurs in seasonally flooded depressions, although it may occur along the edges of such sites. It is listed by SCDNR as an S3 species.

Three-angle spikerush (*Eleocharis tricostata*)
Three-angle spikerush is found in wet sandy or peaty depressions, pond margins, pine barrens, savannas, mostly coastal plains. The species is listed by SCDNR as S2.

Florida thorough-wort (*Eupatorium anomalum*)
Florida thorough-wort is found on wet, low ground and flatwoods. The species is listed by SCDNR as S1.

Long-horn orchid (*Habenaria quinqueseta*)
This orchid species is found in dry to wet pine savannas and mixed flatwoods, hammocks, swamps, meadows, and roadsides. It is listed by SCDNR as S1.

Southeastern sneezeweed (*Helenium pinnatifidum*)
Southern sneezeweed is listed by SCDNR as an S2 species. It is found in ditches, other moist areas such as wet woods, bogs, and swamp edges.

Carolina St. Johns-wort (*Hypericum nitidum*)
Carolina St. Johns-wort is found in moist sunny locations and is listed by SCDNR as S1.

Large-stem morning-glory (*Ipomoea macrorhiza*)
Large-stem morning-glory can be found in old fields, dry sandy or clay locations in full sun. This species is listed by SCDNR as S1.

Walter's iris (*Iris hexagona*)
Walter's iris is found in swamps, marshes and wet prairies in wet to moist, poorly-drained to moderately well-drained organic soils. It is classified by SCDNR as S1.

Small's bog-button (*Lachnocaulon minus*)
This species is found on sands and peats of pond edges, ditch banks, lake shores, drawdowns or moist exposed seeps. It is listed by SCDNR as S1.

Slender gayfeather (*Liatris gracilis*)
The gayfeather is typically found in habitats such as flatwoods, sand hills, scrub, and deciduous woodlands, and especially where there is plenty of sunlight and well-drained soils. It is very tolerant of drought and also can survive in moist soils so long as those conditions do not persist for too long a period. SCDNR lists it as an S1 species.

Pondberry (*Lindera melissifolia*)
Pondberry is associated with wetland habitats such as bottomland and hardwoods in the interior areas, and the margins of sinks, ponds and other depressions in the more coastal sites. The plants generally grow in shaded areas but may also be found in full sun. The species is listed by SCDNR as S2 and is federally-listed as Endangered. There are no known occurrences of the species within one mile of the subject site, and none were observed during field investigations.

Southern twayblade (*Listera australis*)
Southern twayblade is such a small orchid that it can easily be overlooked. It grows on rich humus of low moist woods, marshes, sphagnum bogs, usually in association with rhizomes of cinnamon fern (*Osmunda cinnamomea*) and royal fern (*O. regalis*). The species is listed by SCDNR as imperiled in the state (S2).

Boykin's lobelia (*Lobelia boykinii*)
This species is found in wet habitats, including: cypress ponds, Carolina bays, depression ponds, and meadows. It is listed by SCDNR as S3.

Lance-leaf seedbox (*Ludwigia lanceolata*)
Lance-leaf seedbox is found in depression marshes, hillside seepages, shallow water of titi-cattail ponds, pine flatwoods, lake edges, between coastal dunes and lakes, and cypress pond pine swamps. It occurs in disturbed areas such as powerline corridors and ditches. The species is listed by SCDNR as S1.

Lance-leaf loosestrife (*Lysimachia hybrida*)
Found in marshes, wet meadows, wet depressions, hammocks, swamps, and stream banks, lance-leaf loosestrife is listed S1 by SCDNR.

Virginia bunchflower (*Melanthium virginicum*)
Virginia bunchflower can be found in bogs, marshes, wet woods, savannas, meadows, and along railroads. The species is listed by SCDNR as S2.

Canada moonseed (*Menispermum canadense*)
Canada moonseed is a vine that prefers moist woods and hedges near streams. It also grows in deciduous woods and thickets, along streams, bluffs and rocky hillsides, and fencerows. It is shade tolerant from sea level to 700 meters. Canada moonseed is listed by SCDNR as imperiled state-wide/rare or uncommon in the state (S2/S3).

Longstem adder's-tongue fern (*Ophioglossum petiolatum*)
This fern species is found in lawns, moist roadsides and grassy areas, open woods, and disturbed sites. The species is listed by SCDNR as S1.

One-flowered broomrape (*Orobanche uniflora*)
One-flowered broomrape occurs in sandy prairies, thickets, moist woods, and on streambanks. The species is listed by SCDNR as S2.

Canby's dropwort (*Oxypolis canbyi*)
Canby's dropwort is found in coastal plain habitats including wet meadows, wet pineland savannas, ditches, sloughs, and around the edges of cypress-pine ponds. The healthiest populations seem to occur in open bays or ponds which are wet most of the year and have little or no canopy cover. Ideal soils have a medium to high organic content and a high water table. They are also acidic, deep, and poorly drained. The species is listed by SCDNR as S2 and is federally-listed as Endangered. There are no known occurrences of the species within one mile of the subject site, and none were observed during field investigations.

Spoon-flower (*Peltandra sagittifolia*)
Spoon-flower is found in acidic bogs and swampy woodlands. The species is listed by SCDNR as S2.

Pineland plantain (*Plantago sparsiflora*)
Pineland plantain is an herb found in open, wet pine savannas, shallow ditches, and seeps. The species is listed by SCDNR as S2.

Yellow fringeless orchid (*Platanthera integra*)
This species is found in wet pine barrens, peaty depressions in pine savannas, and wet sandy woods. It is listed by SCDNR as S1.

Green-fringe orchid (*Platanthera lacera*)
This species of orchid is found in sphagnum bogs, alluvial and swamp forests, stream banks, riparian meadows, sand flats, moist and seeping slopes, prairies, roadside banks, ditches, old fields, and borrow pits. It is listed by SCDNR as S2.

Shadow-witch orchid (*Ponthieva racemosa*)
The shadow-witch orchid flowers fall to winter (September to February), and is found in moist, shady hammocks, swamps, ravines, wet savannas, pine forests at elevations from sea level to 50 meters. The species is listed by SCDNR as S2.

Whisk fern (*Psilotum nudum*)
Whisk fern may be found in low to mesic woods, thickets, swamps, hammocks, and rocky slopes. The species is listed by SCDNR as S1.

Bluff oak (*Quercus austrina*)
Found in river bottoms, wet forests, and flatwoods, bluff oak is listed by SCDNR as an S1 species.

Awned meadowbeauty (*Rhexia aristosa*)
Awned meadowbeauty is found in wetlands, wet savannahs, pond beds, flooded bays, cypress bays, pond-cypress savannas, wet pinelands, ditches, grass-sedge dominated Carolina bays, vernal ponds, depression meadows, or limesink ponds. It is listed by SCDNR as S3.

Short-bristle baldrush (*Rhynchospora breviseta*)
This species is found in moist to wet sands or peats of bogs, depressions in savannas, open pinelands, and pond shores. It is listed by SCDNR as S1.

Beakrush (*Rhynchospora globularis* var. *pinetorum*)
This beakrush occurs in sandy savannas, clearings in pine flatwoods, moist sandy swales, bog margins, ponds, and lakeshores. It is listed as S1 by SCDNR.

Long-beaked baldrush (*Rhynchospora scirpoides*)
Long-beaked baldrush habitat consists of moist to wet sands or peats of banks of streams and ditches, pond and lakeshores, depressions in savannas, marshes, often in moist to wet disturbed areas. The species is listed by SCDNR as S1.

Chapman beakrush (*Rhynchospora stenophylla*)
This species is found in sands and peats of bogs, seeps, pond shores, flatwoods, and savannas. It is listed by SCDNR as an S2 species.

Tracy beakrush (*Rhynchospora tracyi*)
Tracy beakrush is an emergent seen in shallows of cypress domes, marshes and swales, ditches and ponds. It is listed by SCDNR as an S3 species.

Sun-facing coneflower (*Rudbeckia heliopsidis*)
The sun-facing coneflower can be found in mesic to wet woodlands and meadows. It is listed by SCDNR as an S1S2 species.

Sweet pitcher-plant (*Sarracenia rubra*)
Sweet pitcher-plant grows well in level areas that are often wet, such as marshlands, bogs, and occasionally open forest. Its preferred habitat includes moist, grassy thickets near the margin of a swamp, although it can also grow in dense shade. The soil is usually peaty and intensely acid. SCDNR classifies sweet pitcher-plant as an S3S4 species.

American chaffseed (*Schwalbea americana*)
Chaffseed is found in sandy, acidic, seasonally moist to dry soils. It is generally found in open, moist pine flatwoods, fire-maintained savannas, ecotonal areas between peaty wetlands and xeric sandy soils, and other open grass-sedge systems. Chaffseed is dependent on fire, mowing, or fluctuating water tables to maintain the crucial open to partly-open conditions that it requires. The species is listed by SCDNR as S2 and is

federally-listed as Endangered. There are no known occurrences of the species within one mile of the subject site, and none were observed during field investigations.

Lace-lip ladies' tresses (*Spiranthes laciniata*)
This species is found primarily in the coastal plain in swamps, marshes, meadows, dry to damp roadsides, ditches, fields, cemeteries, lawns, and occasionally in standing water. It is listed by SCDNR as an S1S2 species.

Reclined meadow-rue (*Thalictrum subrotundum*)
Reclined meadow-rue may be found in low woods, rich wooded slopes, cliffs, swampy forests, meadows, and limestone sinks. The species is listed by SCDNR as an S1S2 species.

Chapman's redtop (*Tridens chapmanii*)
Listed by SCDNR as S1, Chapman's redtop is found in dry pine and oak woods and sandy roadsides.

Least trillium (*Trillium pusillum* var. *pusillum*)
Least trillium blooms late March to mid-April. It is endemic to the Outer Coastal Plain of the Carolinas, and occurs on floodplains near small streams, swampy woods, and calcareous savannas. The species is listed by SCDNR as S1.

Nodding pogonia (*Triphora trianthophora*)
Nodding pogonia is typically found in moist, rich deciduous forests. In late summer, when the species is in flower, the understory of its typical habitat is dark and devoid of competing vegetation. This plant is listed by SCDNR as S2.

Short-leaved yellow-eyed grass (*Xyris brevifolia*)
This species is found in acid, sandy, moist savanna and cleared areas. It is listed by SCDNR as S1.

Florida yellow-eyed grass (*Xyris difformis* var. *floridana*)
Florida yellow-eyed grass can be found in moist to wet sands or sandy peats of bogs, pine savanna, shores, and seeps. The species is listed by SCDNR as S2.

Elliott yellow-eyed grass (*Xyris elliottii*)
This grass is found in acid sandy flatwoods, sandy shores, swales in pinelands, and bog edges in the coastal plain. Elliott yellow-eyed grass is listed by SCDNR as S2.

Savannah yellow-eyed grass (*Xyris flabelliformis*)
Savannah yellow-eyed grass is found in acid, sandy, peaty flatwoods, clearings, and disturbed moist sands in the coastal plain. This grass is listed by SCDNR as S1.

Pineland yellow-eyed grass (*Xyris stricta*)
Pineland yellow-eyed grass is tufted, usually in large, rigid-leaved, clumps, whose brown, fibrous bases are set on muck or wet sand in shallow water. Its habitat is cypress flats, bogs, roadside ditches, and pineland ponds. The species is listed by SCDNR as S1.

Conclusions

Wetland areas within the project area are fairly extensive, especially in the portion of the Project Area south of US Highway 78. Of the approximately 169 acres that encompass the Project Area, approximately 54.4 acres are wetlands. At the time of the in-field 2018 protected species update, all wetlands (those in ROWs) had been cleared of most shrub and all canopy vegetation.

The 2012 literature and records search revealed one known occurrence of least tern (*Sterna antillarum*), two occurrences of yellow fringeless orchid (*Platanthera integra*), one occurrence of green fringe orchid (*P. lacera*), one occurrence of crestless plume orchid (*Pteroglossapis ecristata*), and one occurrence of scarlet Indian-paintbrush (*Castilleja coccinea*) within one mile of the Project Area. All of these species are state-

listed; none are federally-listed. Since the 2012 literature and records search, SCDNR has developed more updated resources showing known occurrences of state and federal listed species. These updated resources reflect that the known occurrences within one mile of the Project Area are the same as they were in the 2012 literature and records search; the only difference is the 2012 search listed one occurrence of least tern within the search radius whereas the 2017 website lists "waterbird colony." It is likely these are the same occurrences.

No occurrences of federal or state listed threatened or endangered species were readily observed within the project area during field investigations. Potential habitat for 72 of the 143 listed species appears to be located within the project area. Of these 72 species, eight (8) are animals and 64 are plants (see Species Descriptions and Results section).

APPENDIX A

Table 1. Federally- and State-Listed Species Occurring or Potentially Occurring in Berkeley and Charleston Counties

Scientific Name	Common Name	State/Federal Status or Rank	Known Occurrence within One Mile?	Habitat within project area?
*Acipenser brevirostrum**	shortnose sturgeon	FE/SE	No	No
Acipenser oxyrinchus	Atlantic sturgeon	FE	No	No
Agalinis aphylla	coastal plain false-foxglove	S1	No	No
Agrimonia incisa	incised groovebur	S2	No	No
*Aimophilia aestivalis**	Bachman's sparrow	S3	No	Yes
Amaranthus pumilus	seabeach amaranth	FT/S1	No	No
*Ambystoma cingulatum**	frosted flatwoods salamander	FT/SE	No	No
*Ambystoma tigrinum tigrinum**	eastern tiger salamander	S2S3	No	No
Amphicarpum muehlenbergianum	blue maiden-cane	S2S3	No	Yes
Andropogon gyrans var. *stenophyllus*	Elliott's bluestem	S1	No	Yes
Andropogon mohrii	broomsedge	S2	No	No
Anthaenantia rufa	purple silkyscale	S2	No	No
Aristida condensata	Piedmont three-awned grass	S2	No	Yes
Asclepias pedicellata	savanna milkweed	S2	No	No
Asplenium heteroresiliens	Wagner's spleenwort	S1	No	No
Asplenium resiliens	black-stem spleenwort	S1	No	No
Bacopa cyclophylla	coastal plain water hyssop	S1	No	Yes
*Balaena glacialis**	Right whale	FE	No	No
*Balaenoptera physalus**	Finback whale	FE	No	No
Botrychium lunarioides	winter grape-fern	S1	No	Yes
Burmannia biflora	northern burmannia	S2	No	Yes
*Calidris canutus rufa**	Red knot	FT	No	No
Calopogon barbatus	bearded grass-pink	S2	No	Yes
Calopogon multiflorus	many-flower grass-pink	S1	No	Yes
Canna flaccida	bandana-of-the-everglades	S2	No	Yes
*Caretta caretta**	loggerhead turtle	FT/ST	No	No
Carex basiantha	widow sedge	S2	No	Yes
Carex chapmanii	Chapman's sedge	S1	No	Yes
Carex crus-corvi	ravenfoot sedge	S2	No	Yes
Carex decomposita	cypress-knee sedge	S2	No	Yes
Carex elliottii	Elliott's sedge	S1	No	Yes
Carex granularis	meadow sedge	S2	No	Yes
Carya myristiciformis	nutmeg hickory	S2	No	No
Castilleja coccinea	scarlet Indian-paintbrush	S2	Yes (1)	Yes
*Charadrius melodus**	Piping plover	FT	No	No
*Charadrius wilsonia**	Wilson's plover	ST	No	No
Chasmanthium nitidum	shiny spikegrass	S1	No	No
Chelonia mydas	Green sea turtle	FT	No	No
*Clemmys guttata**	spotted turtle	ST	No	Yes
*Condylura cristata**	star-nosed mole	S3	No	Yes
Coreopsis integrifolia	ciliate-leaf tickseed	S1	No	Yes
Cornus racemosa	Stiff dogwood	S1	No	Yes
*Corynorhinus rafinesquii**	Rafinesque's big-eared bat	SE	No	No

*Crotalus adamanteus**	Eastern diamondback rattlesnake	S3	No	Yes
Cyperus tetragonus	piedmont flatsedge	S2	No	No
*Dermochelys coriacea**	Leatherback sea turtle	FE	No	No
Dionaea muscipula	Venus' fly-trap	S3	No	Yes
*Elanoides forficatus**	American swallow-tailed kite	SE	No	Yes
Eleocharis robbinsii	Robbins spikerush	S2	No	No
Eleocharis tricostata	three-angle spikerush	S2	No	Yes
Eleocharis vivipara	viviparous spike-rush	S1	No	No
Epidendrum conopseum	green-fly orchid	S3	No	No
Eryngium aquaticum var. *ravenelii*	Ravenel's eryngo	S1	No	No
Eupatorium anomalum	Florida thorough-wort	S1	No	Yes
Eupatorium recurvans	coastal plain thorough-wort	S1	No	No
Forestiera godfreyi	Godfrey's privet	S1	No	No
Galactia elliotti	Elliott's milkpea	S1	No	No
Habenaria quinqueseta	Long-horn orchid	S1	No	Yes
*Haliaeetus leucocephalus**	bald eagle	ST	No	No
Helenium pinnatifidum	southeastern sneezeweed	S2	No	Yes
Hypericum nitidum	Carolina St. John's-wort	S1	No	Yes
Ipomoea macrorhiza	large-stem morning-glory	S1	No	Yes
Iris hexagona	Walter's iris	S1	No	
Lachnocaulon minus	Small's bog button	S1	No	Yes
*Lepidochelys kempii**	Kemp's ridley sea turtle	FE	No	No
Lepuropetalon spathulatum	southern lepuropetalon	S2	No	No
Liatris gracilis	Slender gayfeather	S1	No	Yes
Lilaeopsis carolinensis	Carolina lilaeopsis	S2	No	No
Lindera melissifolia	pondberry	FE/S2	No	Yes
Listera australis	southern twayblade	S2	No	Yes
*Lithobates capito**	Gopher frog	SE	No	No
Litsea aestivalis	pondspice	S3	No	No
Lobelia boykinii	Boykin's lobelia	S3	No	Yes
Ludwigia lanceolata	lance-leaf seedbox	S1	No	Yes
Lysimachia hybrida	lance-leaf loosestrife	S1	No	Yes
*Megaptera novaengliae**	Humpback whale	FE	No	No
Melanthium virginicum	Virginia bunchflower	S2	No	Yes
Menispermum canadense	Canada moonseed	S2S3	No	Yes
*Microtus pennsylvaticus**	Meadow vole	S3	No	Yes
*Micrurus fulvius**	eastern coral snake	S2	No	Yes
Monotropsis odorata	sweet pinesap	S2	No	No
Muhlenbergia filipes	Bentgrass	S3S4	No	No
*Mycteria americana**	wood stork	FT/SE	No	No
*Myotis austroriparius**	southeastern bat	S1S2	No	No
*Myotis septentrionalis**	Northern long-eared bat	FT/S1	No	No
Myriophyllum laxum	piedmont water-milfoil	S2	No	No
*Neotoma floridana haematoreia**	eastern woodrat	S3S4	No	Yes

*Nerodia floridana**	Florida green watersnake	S2	No	No
Ophioglossum petiolatum	longstem adder's-tongue fern	S1	No	Yes
*Ophisaurus compressus**	island glass lizard	S1S2	No	No
Orobanche uniflora	one-flowered broomrape	S2	No	Yes
Oxypolis canbyi	Canby's dropwort	FE/S2	No	Yes
Paspalum bifidum	bead-grass	S2	No	No
*Pelecanus occidentalis**	brown pelican	S1S2	No	No
Peltandra sagittifolia	spoon-flower	S2	No	Yes
*Picoides borealis**	red-cockaded woodpecker	FE/SE	No	No
Pieris phillyreifolia	climbing fetterbush	S1	No	No
*Pituophis melanoleucus**	pine or gopher snake	S3S4	No	No
Plantago sparsiflora	pineland plantain	S2	No	Yes
Platanthera integra	yellow fringeless orchid	S1	Yes (2)	Yes
Platanthera lacera	green-fringe orchid	S2	Yes (1)	Yes
Ponthieva racemosa	shadow-witch orchid	S2	No	Yes
*Pseudobranchus striatus**	dwarf siren	ST	No	No
Psilotum nudum	whisk fern	S1	No	Yes
Pteroglossaspis ecristata	crestless plume orchid	S2	Yes (1)	No
Quercus austrina	bluff oak	S1	No	Yes
Quercus similis	bottomland post oak	S1	No	No
Rhexia aristosa	awned meadowbeauty	S3	No	Yes
Rhynchospora breviseta	short-bristle baldrush	S1	No	Yes
Rhynchospora careyana	horned beakrush	S3	No	No
Rhynchospora cephalantha var. *attenua*	pocosin beaksedge	S1	No	No
Rhynchospora globularis var. pinetorum	beakrush	S1	No	
Rhynchospora harperi	Harper beakrush	S1	No	No
Rhynchospora inundata	drowned hornedrush	S2	No	No
Rhynchospora oligantha	few-flowered beakrush	S2	No	No
Rhynchospora pleiantha	brown beaked-rush	S1	No	No
Rhynchospora scirpoides	long-beaked baldrush	S1	No	Yes
Rhynchospora stenophylla	Chapman beakrush	S2	No	Yes
Rhynchospora tracyi	Tracy beakrush	S3	No	Yes
Rudbeckia heliopsidis	sun-facing coneflower	S1S2	No	Yes
Sageretia minutiflora	tiny-leaved buckhorn	S3	No	No
Sarracenia rubra	Sweet pitcher-plant	S3S4	No	
Schwalbea americana	American chaffseed	FE/S2	No	Yes
*Sciurus niger**	Southern fox squirrel	S3S4	No	No
Scleria baldwinii	Baldwin nutrush	S2	No	No
Smilax biltmoreana	Biltmore greenbrier	S2	No	No
Spiranthes laciniata	lace-lip ladies' tresses	S1S2	No	Yes
Sporobolus curtissii	pineland dropseed	S1	No	No
Sporobolus pinetorum	Carolina dropseed	S2	No	No
*Sterna antillarum**	least tern	ST	Yes (1)	No
Thalictrum subrotundum	reclined meadow-rue	S1S2	No	Yes
*Trichechus manatus**	West Indian manatee	FT	No	No
Tridens carolinianus	Carolina fluff grass	S1	No	No
Tridens chapmanii	Chapman's redtop	S1	No	Yes

Trillium pusillum var. *pusillum*	least trillium	S1	No	Yes
Triphora trianthophora	nodding pogonia	S2	No	Yes
Utricularia macrorhiza	greater bladderwort	S1	No	No
*Vermivora bachmanii**	Bachman's warbler	FE/SE	No	No
Xyris brevifolia	short-leaved yellow-eyed grass	S1	No	Yes
Xyris difformis var. *floridana*	Florida yellow-eyed grass	S2	No	Yes
Xyris elliottii	Elliott yellow-eyed grass	S2	No	Yes
Xyris flabelliformis	savannah yellow-eyed grass	S1	No	Yes
Xyris stricta	pineland yellow-eyed grass	S1	No	Yes

ST – State Threatened
SE – State Endangered
FT – Federally Threatened
FE – Federally Endangered
*Denotes animal species
S1 – Critically imperiled state-wide because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation.
S2 – Imperiled state-wide because of rarity or factor(s) making it vulnerable.
S3 – Rare or uncommon in state.

APPENDIX B

Photo 1. View of transmission line approximately 0.5 mile NW of Pepperhill substation, facing SE.

Photo 2. Just north of Palmetto Commerce Parkway, facing N.

Photo 3. Line approximately one mile N of Palmetto Commerce Parkway, facing S.

Photo 4. View of line just N of Ancrum Road, facing S.

Photo 5. Line approximately 2000 feet SE of Wisteria Street, facing SE.

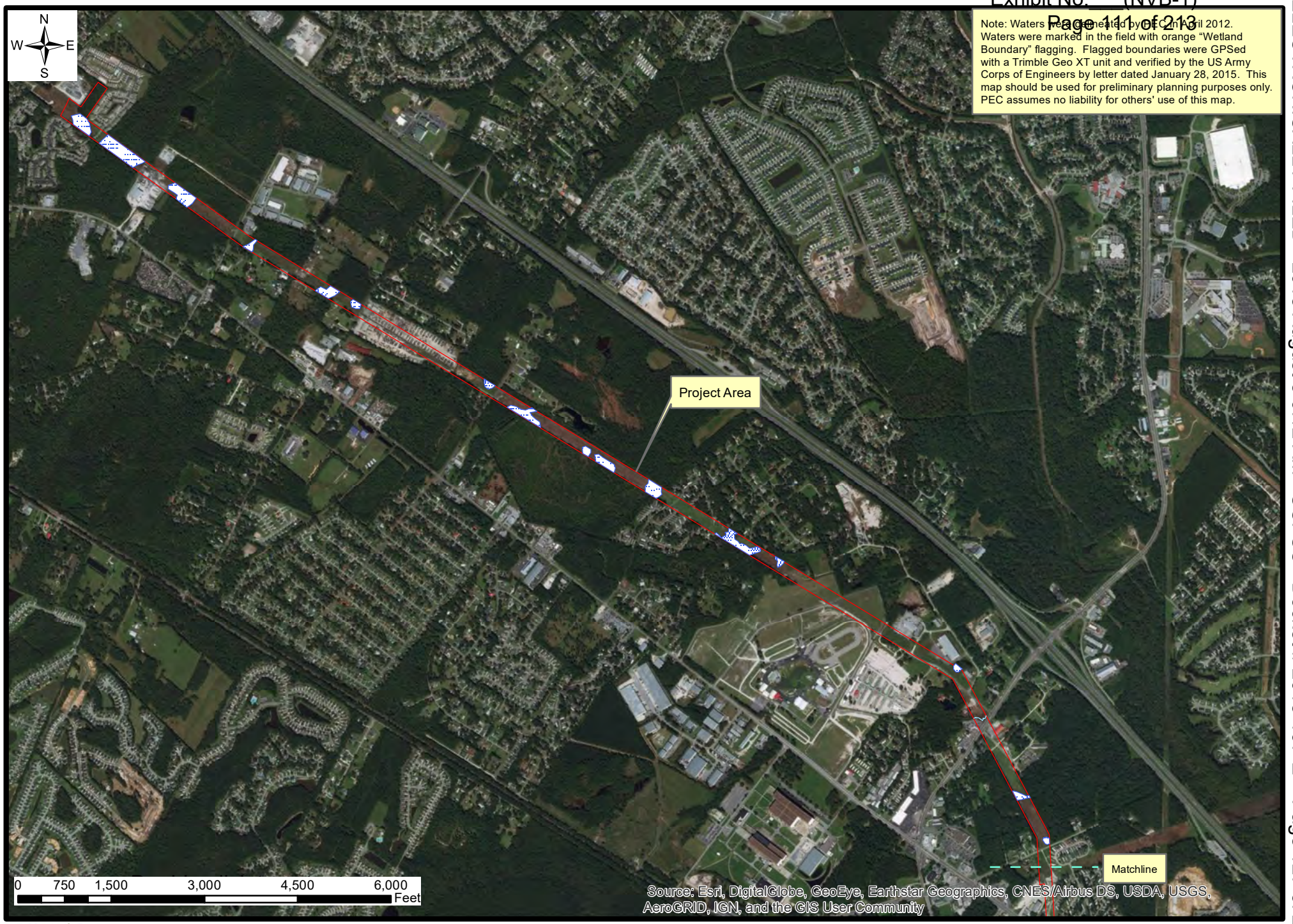
Photo 6. Just SE of Limehouse Lane, facing SE.

Photo 7. View of line approximately 1300 feet NW of Royle Road, facing NW.

Photo 8. Approximately 800 feet SE of Poplar Grove Place, facing NE (upstream).

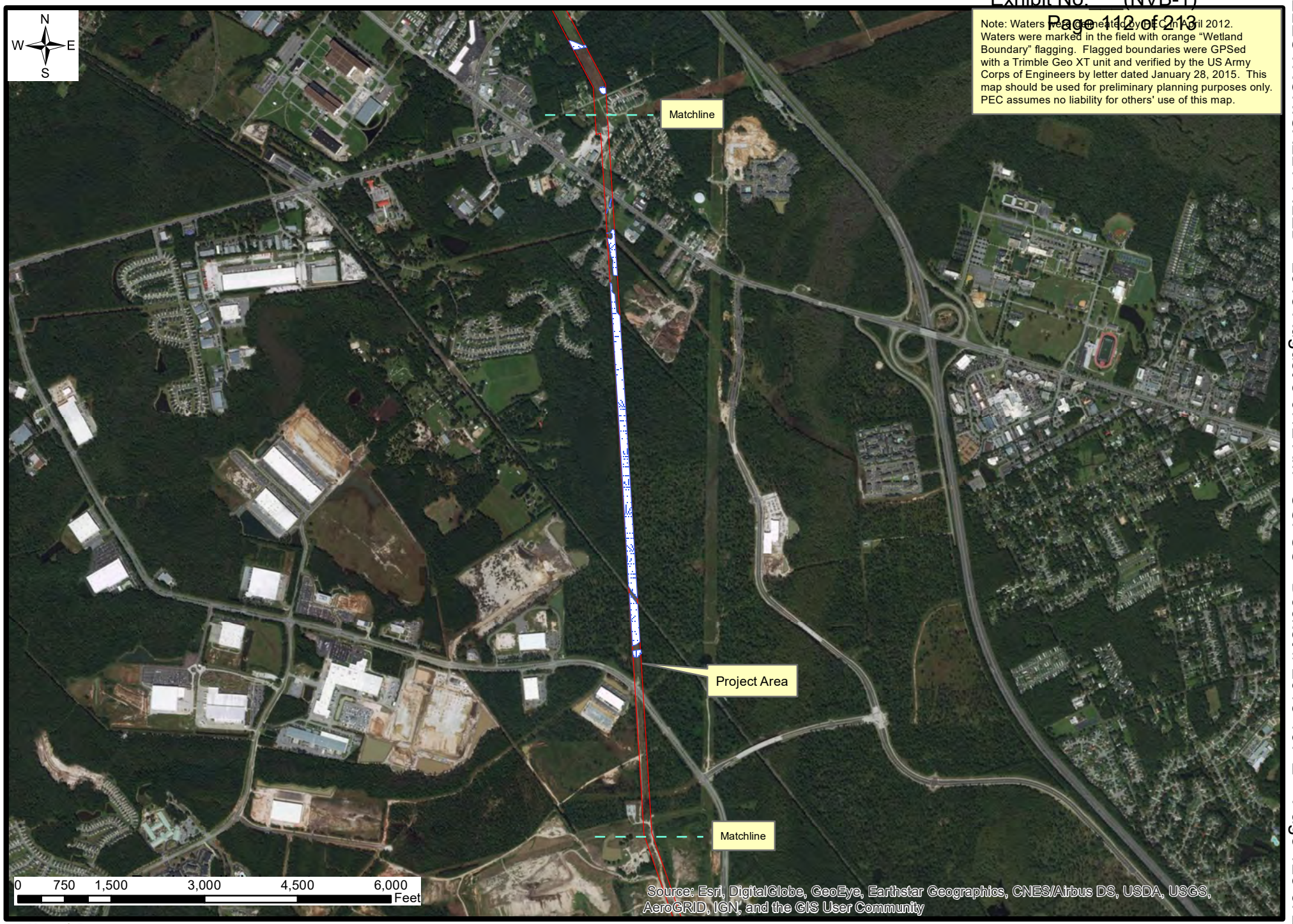
Photo 9. Standing at the Summerville substation, facing SE.

APPENDIX C



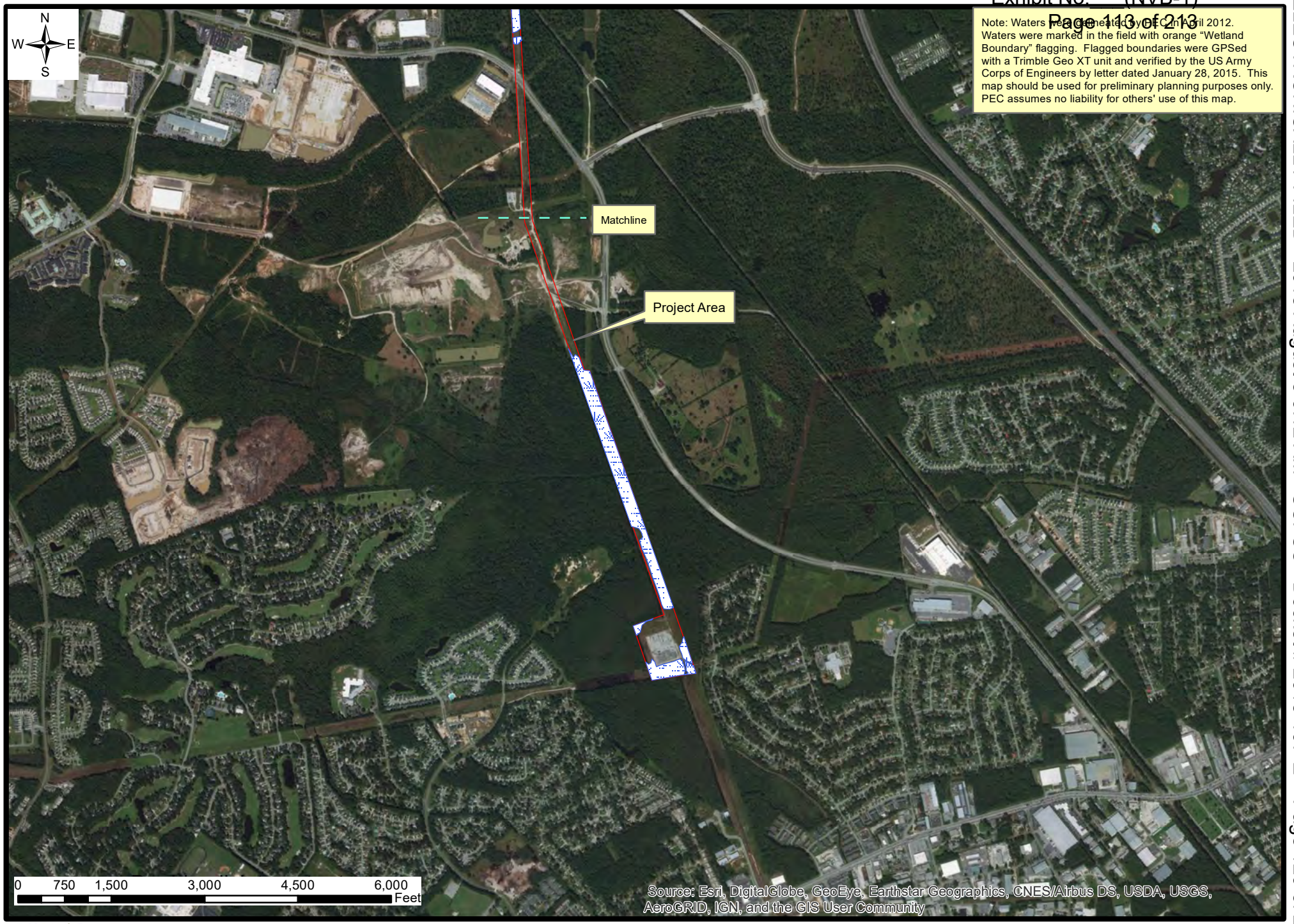
Palmetto Environmental Consulting, Inc

Figure 1a. Approximate Waters Map
Pepperhill - Summerville 230kV Line and Williams - Pepperhill Line Segment
Berkeley and Charleston Counties, SC
April 19, 2018



Palmetto Environmental Consulting, Inc

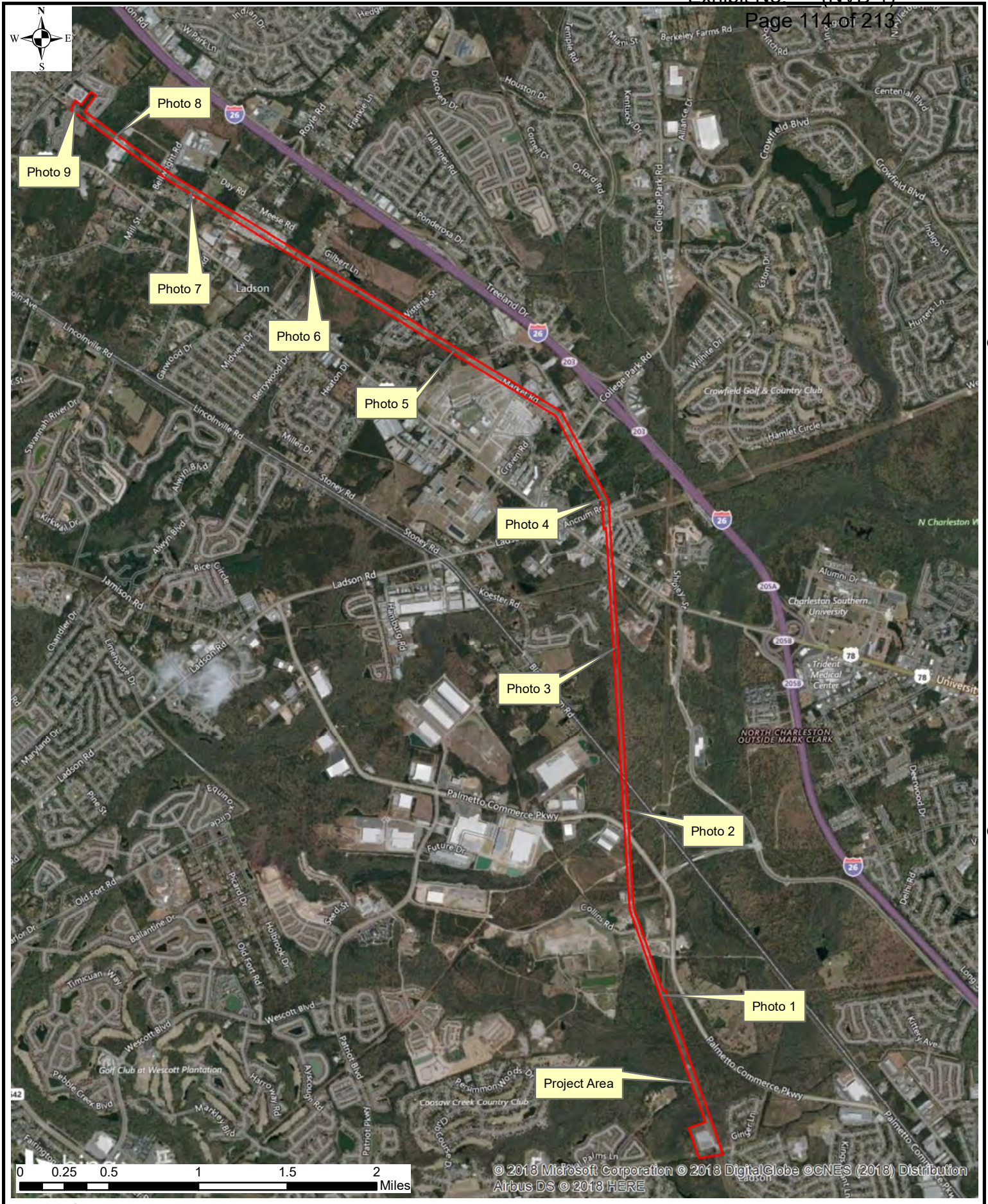
Figure 1b. Approximate Waters Map
Pepperhill - Summerville 230kV Line and Williams - Pepperhill Line Segment
Berkeley and Charleston Counties, SC
April 19, 2018



Note: Waters were delineated by PEC in April 2012. Waters were marked in the field with orange "Wetland Boundary" flagging. Flagged boundaries were GPSed with a Trimble Geo XT unit and verified by the US Army Corps of Engineers by letter dated January 28, 2015. This map should be used for preliminary planning purposes only. PEC assumes no liability for others' use of this map.

Palmetto Environmental Consulting, Inc

Figure 1c. Approximate Waters Map
Pepperhill - Summerville 230kV Line and
Williams - Pepperhill Line Segment
Berkeley and Charleston Counties, SC
April 19, 2018



Palmetto Environmental Consulting, Inc

Figure 2. Photo Locations
Pepperhill - Summerville 230kV Line and
Williams - Pepperhill Line Segment
Berkeley and Charleston Counties, SC
April 19, 2018

APPENDIX C

CULTURAL RESOURCES REPORT

Cultural Resources Survey of the Summerville-Pepperhill 230 kV Transmission Line

Berkeley and Charleston Counties, South Carolina



September 2014

Brockington®
CULTURAL RESOURCES CONSULTING

Cultural Resources Survey of the Summerville-Pepperhill 230 kV Transmission Line

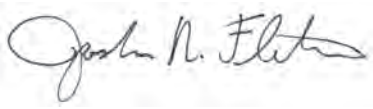
Berkeley and Charleston Counties, South Carolina

Final Report

September 2014

Prepared for:
UC Synergetic, LLC
Fort Mill, South Carolina

Prepared by:



Joshua N. Fletcher, RPA
Principal Investigator

Brockington and Associates, Inc.

Atlanta • Charleston • Elizabethtown
Jackson • Jacksonville • Pensacola • Savannah

Abstract

From May 27-30 and July 18, 2014, Brockington and Associates, Inc. conducted a cultural resources survey of the proposed 7.8-mile long Summerville-Pepperhill 230 kV Transmission Line in Berkeley and Charleston Counties, South Carolina. To adequately handle projected future electric power demand while maintaining the operational integrity of its electrical transmission system in the southeastern portion of its service area, South Carolina Electric & Gas (SCE&G) must add a single-circuit 230 kV line between its existing Summerville and Pepperhill 230/115 kV substations. This work was conducted for UC Synergetic, LLC for the purpose of determining if any historic properties would be affected by ground disturbance associated with the construction and development of the 230 kV line. This cultural resources survey is part of the Section 106 compliance requirements pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, as administered by the US Army Corps of Engineers (USACE). Survey methods undertaken during the investigation process were conducted in compliance with Section 106 of the National Historic Preservation Act of 1966 (as amended through 2000), and 36 CFR 800 (Protection of Historic Properties). Survey tasks were completed in compliance with criteria defined under the Secretary of the Interior's Professional Qualification Standards (36 CFR Part 61).

A cultural resources literature review and architectural windshield reconnaissance was completed by Brockington and Associates, Inc. (Wagoner 2012) in 2012 for the project. UC Synergetic, LLC used the GIS data from Wagoner's (2012) study as part of a viewshed analysis of the proposed new single-pole double-circuit towers. The current investigations of the Summerville-Pepperhill 230 kV Transmission Line included background research and archaeological survey. Background research involved review of historic maps and plats of the region, review of the ArchSite database, and review of Wagoner's (2012) background research and report for the project area. Field investigations included archaeological survey of the existing right-of-way (ROW) of the 7.8-mile long corridor and small additions to the existing Summerville and Pepperhill substations at each end of the corridor. For the current project, no new ROW is required and the 230 kV transmission line is being rebuilt in situ. There are no survey eligible structures within the project corridor.

During these investigations, we revisited three previously recorded archaeological sites (38CH230, 38CH1014, and 38CH2159) within the project corridor. Site 38CH230, located at Windsor Hill, was the site of General William Moultrie's grave. The site also contained the ruins of the main house at Windsor Hill Plantation; the house burned in 1850. The site was nominated for listing on the National Register of Historic Places (NRHP) (Novick 1978) and was considered by the National Register Review Board in 1979; however, it was deferred (due to owner objection), so the site was never actually listed on the NRHP. Due to developmental pressures in the 1970s, all the burials were moved (South 1979a, 1979b). General Moultrie was reburied at Fort Moultrie on Sullivans Island, and the rest were reinterred at St. James Parish Church near Goose Creek (Heitzler 2006:191-196). Prior to the development/razing of the site area, Powell and South (1986) conducted emergency salvage archaeological investigations at Site 38CH230. Because of the removal of General Moultrie's and all others remains, as well as the razing of all traces of Site 38CH230, it was determined that Windsor Hill–Site 38CH230

does not meet National Register Standards to be listed on the NRHP. No evidence of 38CH230 was encountered during the current survey investigations.

Investigators revisited the reported location of previously identified NRHP potentially eligible Site 38CH1014 (Tippett 1988a) and found that the entire area has been disturbed/destroyed by grading and the deposition of fill materials; these activities appear to be associated with the active landfill just north of the reported location of the site. No evidence remains of Site 38CH1014 within the current project corridor.

Site 38CH2159, an extensive inland rice dike system located near the east end of McChune Branch, was identified by Fletcher et al. (2008) during the cultural resources survey of the Palmetto Commerce Parkway Extension Project. Fletcher et al. (2008) mapped the extent of 38CH2159 up to the eastern edge of the transmission line corridor that is the current Summerville-Pepperhill 230 kV Transmission Line project corridor. The current investigations for the Summerville-Pepperhill 230 kV Transmission Line resulted in the slight extension of the western mapped limits of 38CH2159 within the transmission line corridor, as well as a newly recorded portion of the site to the north of the Pepperhill substation. Site 38CH2159 remains eligible for the NRHP and the placement of new single-pole double-circuit towers within existing cleared areas should avoid/span ditches and embankments that are elements of the site. The newly recorded portion of 38CH2159 to the northwest of the Pepperhill substation is located within a relatively undisturbed wooded area. If trees are to be removed from the approximately 50-foot (ft)-wide strip along the southern edge of the wooded area, caution should be exercised in the area of and adjacent to the embankment and ditches associated with Site 38CH2159. Trees and vegetation in this area should be carefully removed by hand (i.e., no heavy machinery on the embankment and ditches) to avoid an adverse effect to Site 38CH2159. Given that inland rice field elements of NRHP-eligible Site 38CH2159 are avoided/spanned, and wooded areas adjacent to and on the embankment and ditches to the northwest of the Pepperhill substation are cleared by hand, proposed land-disturbing activities in the Summerville-Pepperhill 230 kV Transmission Line project will not affect any historic properties and should be allowed to proceed without further management consideration. If these embankments/ditches cannot be avoided, then all proposed mitigation of adverse effects to Site 38CH2159 will be developed in consultation with SCDAH.

Acknowledgments

The authors would like to thank Dwight Hollifield and Ralph Miller of UC Synergetic, LLC for their assistance during this project. The archaeological field crew consisted of Josh Fletcher as Principal Investigator, Scott Kitchens, and Jimmy Lefebre. Ralph Bailey, David Dellenbach, and Josh Fletcher conducted the background research. David Dellenbach and Michael Walsh prepared graphics for this document. Alicia Sullivan provided editorial assistance and produced the report.

Table of Contents

List of Figures and Tables

1.0 Introduction and Methods

1.1 Introduction

From May 27-30 and July 18, 2014, Brockington and Associates, Inc., conducted a cultural resources survey of the proposed 7.8-mile long Summerville-Pepperhill 230 kV Transmission Line in Berkeley and Charleston Counties, South Carolina. To adequately handle projected future electric power demand while maintaining the operational integrity of its electrical transmission system in the southeastern portion of its service area, South Carolina Electric & Gas (SCE&G) must add a single-circuit 230 kV line between its existing Summerville and Pepperhill 230/115 kV substations. The investigations were conducted for UC Synergetic, LLC for the purpose of determining if any historic properties would be affected by ground disturbance associated with the construction and development of the 230 kV line. This cultural resources survey is part of the Section 106 compliance requirements pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, as administered by the US Army Corps of Engineers (USACE). Survey methods undertaken during the investigation process were conducted in compliance with Section 106 of the National Historic Preservation Act of 1966 (as amended through 2000), and 36 CFR 800 (Protection of Historic Properties). Survey tasks were completed in compliance with criteria defined under the Secretary of the Interior's Professional Qualification Standards (36 CFR Part 61). The principal investigator for this project meets the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (36 CFR Part 61) and is listed on the Register of Professional Archaeologists (RPA).

The Summerville-Pepperhill 230 kV Transmission Line is on an existing transmission line corridor. Adding a single-circuit 230 kV line between the existing Summerville and Pepperhill 230/115 kV substations will be accomplished on existing rights-of-way (ROW) by replacing existing 230 kV single-circuit H-frame structures with single-pole double-circuit towers. The SCE&G ROWs vary from 125 to 195 feet wide and accommodate one or more parallel electric transmission lines, but the area affected by the new line construction will generally vary from 70 to 100 ft wide. Investigators inspected the proposed areas to be affected by the new line construction, which vary along the existing corridor. The new structures, averaging between 80 and 120 ft tall and spaced typically 400 to 700 ft apart, will hold both an existing 230 kV circuit and the new Summerville-Pepperhill 230 kV circuit. As they enter each SCE&G-owned substation property parcel, the new and existing 230 kV circuits may be separated and aligned slightly differently, but no new ROW will be required. The southern portion of the Summerville-Pepperhill 230 kV Transmission Line begins at the Pepperhill substation and is located in northern Charleston County, in the City of North Charleston. The existing transmission line ends approximately 7.8 miles to the north at the Summerville substation, located in southern Berkeley County, near the City of Summerville. Figure 1.1 shows the location of the Summerville-Pepperhill 230 kV Transmission Line and all identified cultural resources on the USGS 1958/p.r. 1979 *Ladson, SC,* 1957/p.r. 1979 *Mount Holly, SC*, and 1979 *Summerville, SC* quadrangles.

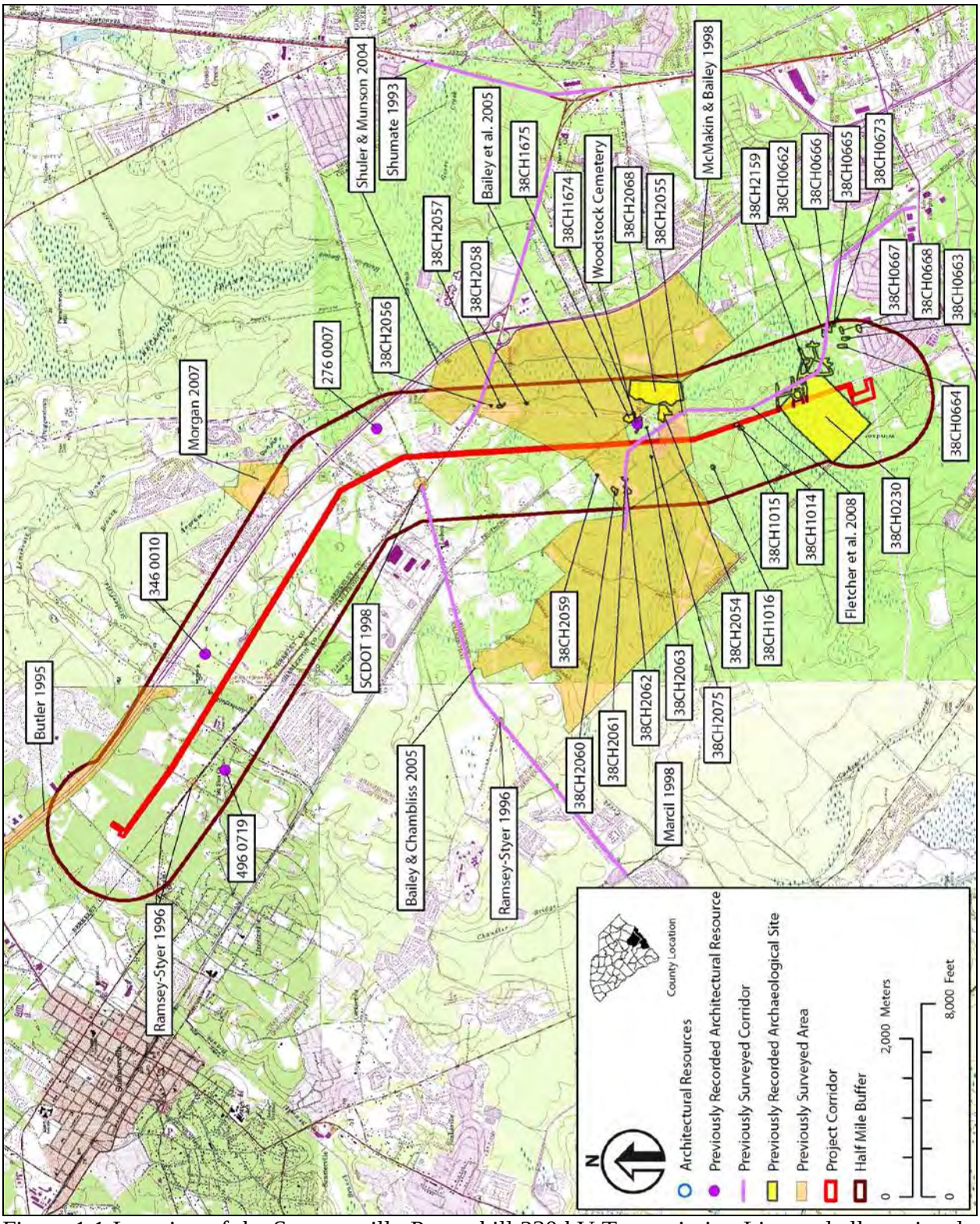


Figure 1.1 Location of the Summerville-Pepperhill 230 kV Transmission Line and all previously identified cultural resources (USGS 1958/p.r. 1979 *Ladson, SC*, 1957/p.r. 1979 *Mount Holly, SC*, and 1979 *Summerville, SC* quadrangles).

A cultural resources literature review and architectural windshield reconnaissance was completed by Brockington and Associates, Inc. (Wagoner 2012) in 2012 during the planning stages of the project and the GIS data was provided to the client. The Summerville-Pepperhill 230kV Line study area investigated by Wagoner (2012) encompassed approximately 24 square miles (approximately 1.24-mile radius around the existing transmission line) within Berkeley, Charleston, and Dorchester Counties. According to ArchSite, there were 13 previously recorded aboveground individual resources within Wagoner's (2012) study area. These resources were as follows: two properties had been determined National Register of Historic Places (NRHP)-eligible, and 11 properties had been determined not eligible. There were no NRHP-listed or potentially eligible resources within the comprehensive study area. In addition to individual resources, ArchSite research revealed that there were no multi-property or district resources within the comprehensive study area. According to ArchSite, 51 previously recorded archaeological sites were located within Wagoner's (2012) comprehensive study area boundary. Of the 51 sites, one site was NRHP-listed but non-extant, six sites were eligible for the NRHP and/or contributed to an eligible district, 16 were determined potentially eligible for the NRHP, eight were determined as probably not eligible for the NRHP, and 20 are not eligible for the NRHP. UC Synergetic, LLC used the GIS data from Wagoner's (2012) cultural resources literature review and architectural windshield reconnaissance as part of a viewshed analysis of the proposed new single-pole double-circuit towers.

For the current project, no new ROW is required and the 230 kV transmission line is being rebuilt in situ. The current investigations involved review of historic maps and plats of the region, review of the ArchSite database, and review of Wagoner's (2012) background research and report. These efforts complement systematic examination of the project corridor. There are three previously identified archaeological sites (38CH230, 38CH1014, and 38CH2159) within the project corridor.

Archaeological survey entailed the systematic examination of the 7.8-mile long project corridor and added areas around the existing Summerville and Pepperhill substations. There are no survey-eligible standing structures within the project corridor. During these investigations, we revisited three previously recorded archaeological sites (38CH230, 38CH1014, and 38CH2159) within the project corridor. Site 38CH230, located at Windsor Hill, was the site of General William Moultrie's grave. The site has been destroyed and all burials were removed in the 1970s. No evidence of 38CH230 was encountered during the current survey investigations. Investigators revisited the reported location of previously identified NRHP potentially eligible Site 38CH1014 (Tippett 1988a) and found that the entire area has been disturbed/destroyed by grading and the deposition of fill materials; these activities appear to be associated with the active landfill just north of the reported location of the site. No evidence remains of Site 38CH1014 within the current project corridor.

Site 38CH2159, an extensive inland rice dike system located near the east end of McChune Branch, was identified by Fletcher et al. (2008) during the cultural resources survey of the Palmetto Commerce Parkway Extension Project. Fletcher et al. (2008) mapped the extent of 38CH2159 up to the eastern edge of the transmission line corridor that is the current Summerville-Pepperhill 230 kV Transmission Line project corridor. The current investigations for the Summerville-Pepperhill 230 kV Transmission Line resulted in the slight extension of the

western mapped limits of 38CH2159 within the transmission line corridor, as well as a newly recorded portion of the site to the northwest of the Pepperhill substation. Site 38CH2159 remains eligible for the NRHP and the placement of new single-pole double-circuit towers within existing cleared areas should avoid/span ditches and embankments that are elements of the site. The newly recorded portion of 38CH2159 to the northwest of the Pepperhill substation is located within a relatively undisturbed wooded area. If trees are to be removed from the approximately 50-ft wide strip along the southern edge of the wooded area, caution should be exercised in the area of and adjacent to the embankment and ditches associated with Site 38CH2159. Trees and vegetation in this area should be carefully removed by hand (i.e., no heavy machinery on the embankment and ditches) to avoid an adverse effect to Site 38CH2159. Given that inland rice field elements of NRHP-eligible Site 38CH2159 are avoided/spanned, and wooded areas adjacent to and on the embankment and ditches to the northwest of the Pepperhill substation are cleared by hand, proposed land-disturbing activities in the Summerville-Pepperhill 230 kV Transmission Line project will not affect any historic properties and should be allowed to proceed without further management consideration. If these embankments/ditches cannot be avoided, then all proposed mitigation of adverse effects to Site 38CH2159 will be developed in consultation with SCDAH.

The remainder of Chapter 1 describes the methods employed during this survey. Chapter 2 presents the environmental and cultural setting of the project area. Chapter 3 presents results of the survey and the recommendations for the management of cultural resources within the project area. Appendix A presents State Historic Preservation Office (SHPO) correspondence for the project.

1.2 Methods of Investigation

The objective of the cultural resources investigations was to assess the potential for development of the Summerville-Pepperhill 230 kV Transmission Line project to affect potential cultural resources within the project boundaries. Tasks performed to accomplish this objective include background research, field investigations, curation of materials associated with the completion of this project, and the assessment of the NRHP eligibility of any revisited resources. Methods employed for each of these tasks are described below.

1.2.1 Background Research

A cultural resources literature review and architectural windshield reconnaissance was completed by Brockington and Associates, Inc. (Wagoner 2012) in 2012 during the planning stages of the project. An examination of listings of identified archaeological sites at the SCIAA and historic properties (sites, buildings, structures, objects, districts, or landscapes listed on or eligible for the NRHP) at the SCDAH was conducted during the 2012 investigations (Wagoner 2012). For the current project, no new ROW is required and the 230 kV transmission line is being rebuilt in situ. The current investigations involved review of historic maps and plats of the region, review of the ArchSite database, and review of Wagoner's (2012) background research and report. The purpose of this research was to identify resources and to develop an historic context that would assist in evaluating any identified cultural resources.

1.2.2 Archaeological Survey

Archaeological survey entailed the systematic examination of the project corridor following *South Carolina Standards and Guidelines for Archaeological Investigations* (COSCAPA et al. 2005). The 7.8-mile long Summerville-Pepperhill 230 kV Transmission Line was methodically inspected by the pedestrian traverse of one transect along varying sides/portions of the existing transmission line ROW (the portions of the corridor where the proposed construction will take place). Inspection of the areas surrounding the existing Pepperhill substation (an approximately 800-by-150-ft area to the north, a 700-by-400-ft area to the west, and a 200- to 250-by-800-ft area to the south) and the approximately 140-by-600-ft area to the southeast of the existing Summerville substation was accomplished by the pedestrian traverse of transects spaced at 100-ft intervals across the spaces.

Shovel tests were excavated at 100-ft intervals along each transect. The ground surface was inspected between each of the shovel test locales along each transect. Each shovel test measured approximately 30 centimeters (cm) in diameter and was excavated into sterile subsoil (usually 50-60+ cm below surface [cm bs]). Investigators recorded information relating to each shovel test in field notebooks. This information included the content (e.g., presence or absence of artifacts) and context (e.g., soil color, texture, stratification) of each test. Investigators excavated 235 out of a possible 455 shovel tests across the project corridor and substation areas. The remaining 220 potential shovel tests were located in wetland or developed areas. All shovel tests were backfilled upon completion. Figure 1.2 displays the locations of shovel tested areas along the Summerville-Pepperhill 230 kV Transmission Line on a modern aerial photograph.

1.2.3 Curation

Research materials associated with this project currently are stored at the Mount Pleasant office of Brockington and Associates, Inc. Upon acceptance of the final report, Brockington and Associates, Inc. will deliver the curation package to SCIAA.

1.2.4 Assessing NRHP Eligibility

All cultural resources encountered are assessed as to their significance based on the criteria of the NRHP. As per 36 CFR 60.4, there are four broad evaluative criteria for determining the significance of a particular resource and its eligibility for the NRHP. Any resource (building, structure, site, object, or district) may be eligible for the NRHP that:

A. is associated with events that have made a significant contribution to the broad pattern of history;

B. is associated with the lives of persons significant in the past;

C. embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, possesses high artistic value, or represents a significant and distinguishable entity whose components may lack individual distinction; or

D. has yielded, or is likely to yield, information important to history or prehistory.

A resource may be eligible under one or more of these criteria. Criteria A, B, and C are most frequently applied to historic buildings, structures, objects, non-archaeological sites (e.g., battlefields, natural features, designed landscapes, or cemeteries), or districts. The eligibility of archaeological sites is most frequently considered with respect to Criterion D. Also, a general guide of 50 years of age is employed to define "historic" in the NRHP evaluation process. That is, all resources greater than 50 years of age may be considered. However, more recent resources may be considered if they display "exceptional" significance (Sherfy and Luce n.d.).

Following *National Register Bulletin: How to Apply the National Register Criteria for Evaluation* (Savage and Pope 1998), evaluation of any resource requires a twofold process. First, the resource must be associated with an important historic context. If this association is demonstrated, the integrity of the resource must be evaluated to ensure that it conveys the significance of its context. The applications of both of these steps are discussed in more detail below.

Determining the association of a resource with a historic context involves five steps (Savage and Pope 1998). First, the resource must be associated with a particular facet of local, regional (state), or national history. Secondly, one must determine the significance of the identified historical facet/context with respect to the resource under evaluation. A lack of Native American archaeological sites within a project area would preclude the use of contexts associated with the Pre-Contact use of a region.

The third step is to demonstrate the ability of a particular resource to illustrate the context. A resource should be a component of the locales and features created or used during the historical period in question. For example, early nineteenth-century farmhouses, the ruins of African American slave settlements from the 1820s, and/or field systems associated with particular antebellum plantations in the region would illustrate various aspects of the agricultural development of the region prior to the Civil War. Conversely, contemporary churches or road networks may have been used during this time period but do not reflect the agricultural practices suggested by the other kinds of resources.

The fourth step involves determining the specific association of a resource with aspects of the significant historic context. Savage and Pope (1998) define how one should consider a resource under each of the four criteria of significance. Under Criterion A, a property must have existed at the time that a particular event or pattern of events occurred, and activities associated with the event(s) must have occurred at the site. In addition, this association must be of a significant nature, not just a casual occurrence (Savage and Pope 1998). Under Criterion B, the resource must be associated with historically important individuals. Again, this association must relate to the period or events that convey historical significance to the individual, not just that this person was present at this locale (Savage and Pope 1998). Under Criterion C, a resource must possess physical features or traits that reflect a style, type, period, or method of construction; display high artistic value; or represent the work of a master (an individual whose work can be distinguished from others and possesses recognizable greatness) (Savage and Pope 1998). Under Criterion D, a resource must possess sources of information that can address specific important research questions (Savage and Pope 1998). These questions must generate information that is important in reconstructing or interpreting the past (Butler 1987; Townsend et

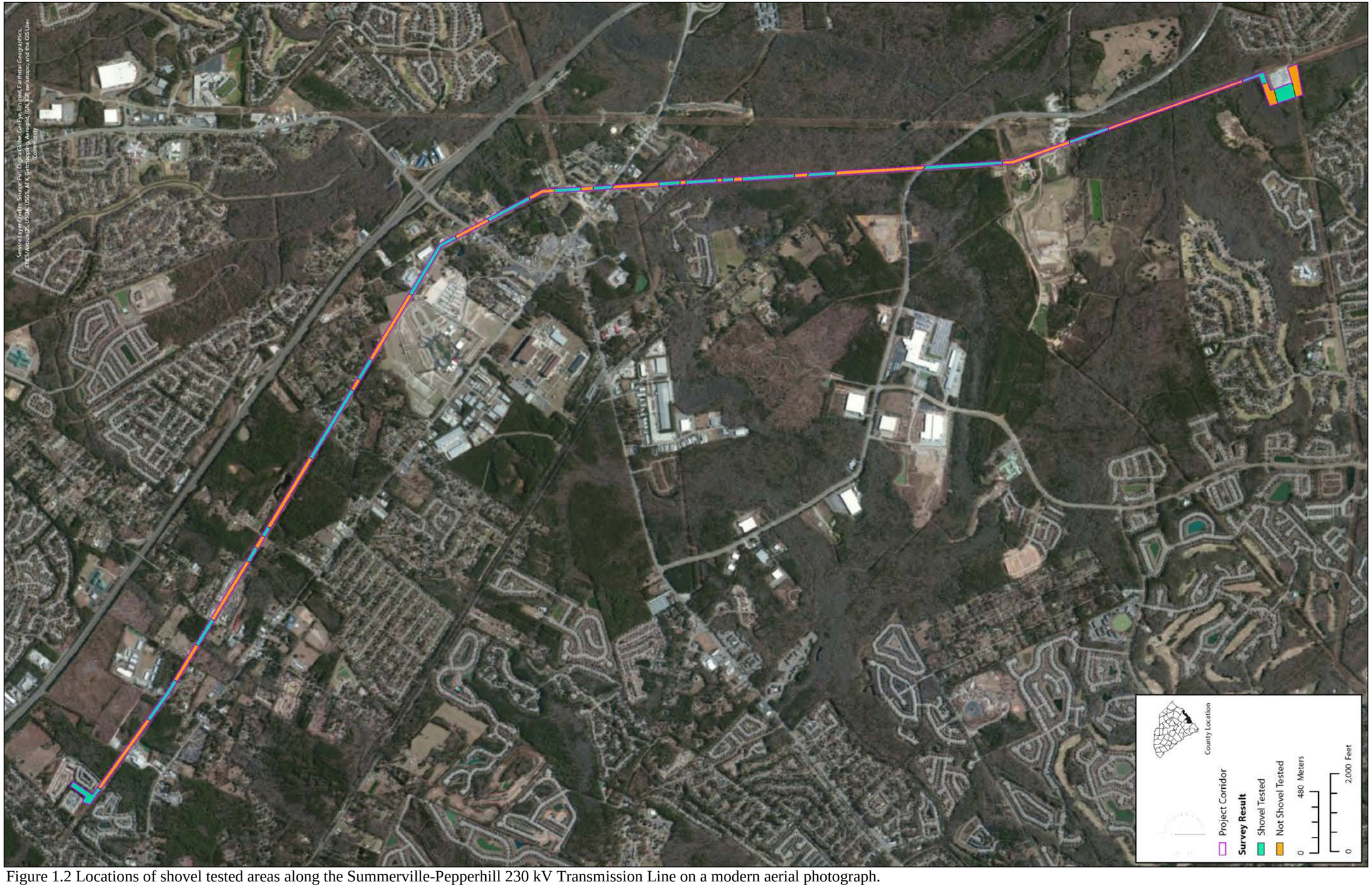


Figure 1.2 Locations of shovel tested areas along the Summerville-Pepperhill 230 kV Transmission Line on a modern aerial photograph.

al. 1993). For archaeological sites, recoverable data must be able to address specific research questions.

After a resource is associated with a specific significant historic context, one must determine which physical features of the resource reflect its significance. One should consider the types of resources that may be associated with the context, how these resources represent the theme, and which aspects of integrity apply to the resource in question (Savage and Pope 1998). As in the antebellum agriculture example given above, a variety of resources may reflect this context (farmhouses, ruins of slave settlements, field systems, etc.). One must demonstrate how these resources reflect the context. The farmhouses represent the residences of the principal landowners who were responsible for implementing the agricultural practices that drove the economy of the South Carolina area during the antebellum period. The slave settlements housed the workers who conducted the vast majority of the daily activities necessary to plant, harvest, process, and market crops.

Once the above steps are completed and the association with a historically significant context is demonstrated, one must consider the aspects of integrity applicable to a resource. Integrity is defined in seven aspects of a resource; one or more may be applicable depending on the nature of the resource under evaluation. These aspects are location, design, setting, materials, workmanship, feeling, and association (36 CFR 60.4; Savage and Pope 1998). If a resource does not possess integrity with respect to these aspects, it cannot adequately reflect or represent its associated historically significant context. Therefore, it cannot be eligible for the NRHP. To be considered eligible under Criteria A and B, a resource must retain its essential physical characteristics that were present during the event(s) with which it is associated. Under Criterion C, a resource must retain enough of its physical characteristics to reflect the style, type, etc., or work of the artisan that it represents. Under Criterion D, a resource must be able to generate data that can address specific research questions that are important in reconstructing or interpreting the past.

2.0 Environmental and Cultural Setting

2.1 Environmental Setting

The proposed Summerville-Pepperhill 230 kV Transmission Line is on an existing transmission line corridor. No new ROW is required for the corridor and the 230 kV transmission line is being rebuilt in situ. As the lines enter each SCE&G-owned substation property parcel, the new and existing 230 kV circuits may be separated and aligned slightly differently, but no new ROW will be required. The southern portion of the Summerville-Pepperhill 230 kV Transmission Line begins at the Pepperhill substation and is located in northern Charleston County, in the City of North Charleston. The transmission line ends approximately 7.8 miles to the north at the Summerville substation, located in southern Berkeley County, in/near the City of Summerville. The majority of the transmission line corridor is grassy, though it passes through several residentially and commercially developed areas. The corridor also passes through several areas of wetlands. Figures 2.1 and 2.2 provide views of the project area.

The project corridor lies within the Ashley-Cooper-Edisto drainage system. The nearest named water source is McChune Branch in the southern portion of the project corridor, which connects to Bluehouse Swamp to the northeast, which extends to Goose Creek, which is a tributary of the Cooper River to the east. The Edisto River empties into Charleston Harbor, which opens into the Atlantic Ocean.

Physiographically, the project area lies on the Lower Coastal Plain of South Carolina. Despite the relative flatness of this physiographic zone, the Coastal Plain is not without geologic features (Eppinette 1990; Kovacik and Winberry 1987). This zone consists of a series of terraces of relict dunes and beach sands deposited by periods of receding and advancing sea water caused by glacial activity during the late Pleistocene epoch. Due to the changing sea levels of this time period, numerous former shorelines, terraces, beach ridges, and deltas were abandoned in areas that are now far inland. Six of these terraces are present in Berkeley and Charleston Counties; all formed during the Pleistocene epoch (Miller 1971:74; Eppinette 1990:89). In order from the Atlantic Ocean, these six terraces are the Recent (current mean sea level to six ft above mean sea level [amsl]), Pamlico (between six and 25 ft amsl), Talbot (25-42 ft amsl), Penholoway (42 to 70 ft amsl), Wicomico (70 to 100 ft amsl), and Sunderland (100 to 170 ft amsl) terraces (Eppinette 1990:89; Miller 1971:74).

The climate of Berkeley County is subtropical, with mild winters and long, hot, and humid summers. The average daily maximum temperature reaches a peak of 89º F in July, although average highs are in the 87º F range from May through September. A mean high of 58.3º F characterizes the coldest winter month, January. Average annual precipitation for Berkeley County is 3.9 ft, with most rain occurring in the summer months during thunderstorms; snowfall is very rare. The growing season averages 260 days, with first and last frosts generally occurring by November 2 and April 3, respectively. Although droughts occur, they are rare. Also, the climate is very supportive of agriculture. Prevailing winds are light and generally from the south and southwest, although hurricanes and other tropical storms occasionally sweep through the area, particularly in the fall months (Long 1980:46, 93-94).

Figure 2.1 Typical views of the Summerville-Pepperhill 230 kV Transmission Line project: typical vegetation in the northern portion of the corridor, facing north (top); typical view of modern residences adjacent to the corridor, facing south (bottom).

Figure 2.2 Typical views of the Summerville-Pepperhill 230 kV Transmission Line project: the corridor as it passes through a landfill, facing south (top); view towards lower area in the southern portion of the corridor, facing south (bottom).

Miller (1971) provides climatic data for Charleston County. The climate of this area is mild and temperate, with mild winters and long, hot, and humid summers. The average daily maximum temperature reaches a peak of 89°F in July and August, although average highs are in the 87°F range from May through September. A mean high of 61°F characterizes the coldest winter months, December and January. Average annual precipitation for Charleston County is about 4.1 ft, with most rain occurring in the summer months during thunderstorms; snowfall is very rare. The growing season averages 280 days. Partial droughts occur an average of once or twice every 10 years. Also, the climate is very supportive of agriculture. Prevailing winds are light and generally southerly in spring and summer and northerly in fall and winter, although hurricanes and other tropical storms occasionally sweep through the area, particularly in the late summer and early fall (Miller 1971: 72-73).

Soils vary across the span of the project corridor. Soils in the northern portion (Berkeley County) of the project corridor consist of Bonneau loamy sand (2 to 6 percent slopes), Chipley-Echaw complex, Duplin fine sandy loam (2 to 6 percent slopes), Goldsboro loamy sand (0 to 2 percent slopes), Lenoir fine sandy loam, Leon fine sand, Lynchburg fine sandy loam, Meggett loam, Norfolk loamy sand (0 to 2 percent slopes), Norfolk loamy sand (2 to 6 percent slopes), Ocilla loamy fine sand, Pantego fine sandy loam, and Rains fine sandy loam. Bonneau loamy sand (2 to 6 percent slopes) soils are well drained soils located on nearly level upland terraces (Eppinette 1990:14). Chipley-Echaw complex soils are level, deep, and moderately well drained (Long 1980:15, 18). Duplin fine sandy loam (2 to 6 percent slopes) soils are moderately well drained soils found on broad ridges (Long 1980:17). Goldsboro loamy sand (0 to 2 percent slopes) soils are moderately well drained soils found on nearly level upland terraces (Eppinette 1990:24). Lenoir fine sandy loam soils are somewhat poorly drained soils located on broad low flats (Long 1980:19-20). Leon fine sand soils are somewhat poorly drained (Miller 1971:17). Lynchburg fine sandy loam soils somewhat poorly drained soils found in broad low areas (Long 1980:21-22). Meggett loam soils are poorly drained soils located in low, flat areas (Long 1980:22-23). Norfolk loamy sand (0 to 2 percent slopes) soils are well drained soils located on broad ridges (Long 1980:23-24). Norfolk loamy sand (2 to 6 percent slopes) soils are well drained soils located on narrow slopes parallel to drainageways and streams and also on broad ridges (Long 1980:23-24). Ocilla loamy fine sand soils are somewhat poorly drained soils found in broad areas (Long 1980:24-25). Pantego fine sandy loam soils are very poorly drained soils found along drainageways and in broad, slightly depressional areas (Long 1980:25-26). Rains sandy loam soils are usually found in shallow depressions, are poorly drained, and are in areas that are irregular in shape (Eppinette 1990: 34).

Soils in the southern portion of the project corridor (Charleston County) consist of Hockley loamy fine sand (0 to 2 percent slopes), Portsmouth fine sandy loam, Rains sandy loam, Santee loam, Wadmalaw fine sandy loam, Wagram loamy fine sand (0 to 6 percent slopes), and Yonges loamy fine sand. Hockley loamy fine sand soils (0 to 2 percent slopes) are moderately well drained soils with a high water table (Miller 1971:16). Portsmouth fine sandy loam soils are nearly level to level, and are poorly drained, wetland-type soils (Miller 1971:22-23). Rains sandy loam soils are nearly level, poorly drained, acid soils that have a loamy surface layer and subsoil (Miller 1971:23-24). Santee loam soils are very poorly drained (Miller 1971:25). Wadmalaw fine sandy loam soils are poorly drained, nearly level soils (Miller 1971:29). Wagram loamy fine sand (0 to 6 percent slopes) soils are well drained soils located on marine terraces (Miller

1971:30). Yonges loamy fine sand soils are poorly drained, level and deep soils (Miller 1971:32).

Information on floral and faunal communities for the area is summarized from general sources such as Quarterman and Keever (1962) and Shelford (1963). Most of the extant woodlands today are either mature hardwood forest or planted pine forests. A mature hardwood forest supports an active faunal community including deer and small mammals (e.g., various squirrels and mice, opossum, raccoon, rabbit, fox, skunk), birds (e.g., various songbirds, ducks, and wading birds, quail, turkey, doves, hawks, owls), and reptiles/amphibians (e.g., frogs, toads, lizards, snakes, turtles, alligator). Freshwater and saltwater fish are abundant in the streams and marshes of the region, and shellfish are present in large numbers in most of the tidally affected waters throughout the region.

Profound changes in climate and dependent biophysical aspects of regional environments have been documented over the last 20,000 years (the time of potential human occupation of the Southeast). Major changes include a general warming trend, melting of the large ice sheets of the Wisconsin glaciation in northern North America, and the associated rise in sea level. This sea level rise was dramatic along the South Carolina coast (Brooks et al. 1989), with an increase of as much as 330 ft during the last 20,000 years. At 10,000 years ago (the first documented presence of human groups in the region), the ocean was located 50 to 100 miles east of its present position. Unremarkable Coastal Plain flatwoods probably characterized the project area. Sea level steadily rose from that time until about 5,000 years ago, when the sea reached essentially modern levels. During the last 5,000 years there was apparently a 400- to 500-year cycle of sea level fluctuations of about two meters (m) (Brooks et al. 1989; Colquhoun et al. 1981). Figure 2.3 summarizes recent fluctuations in the region.

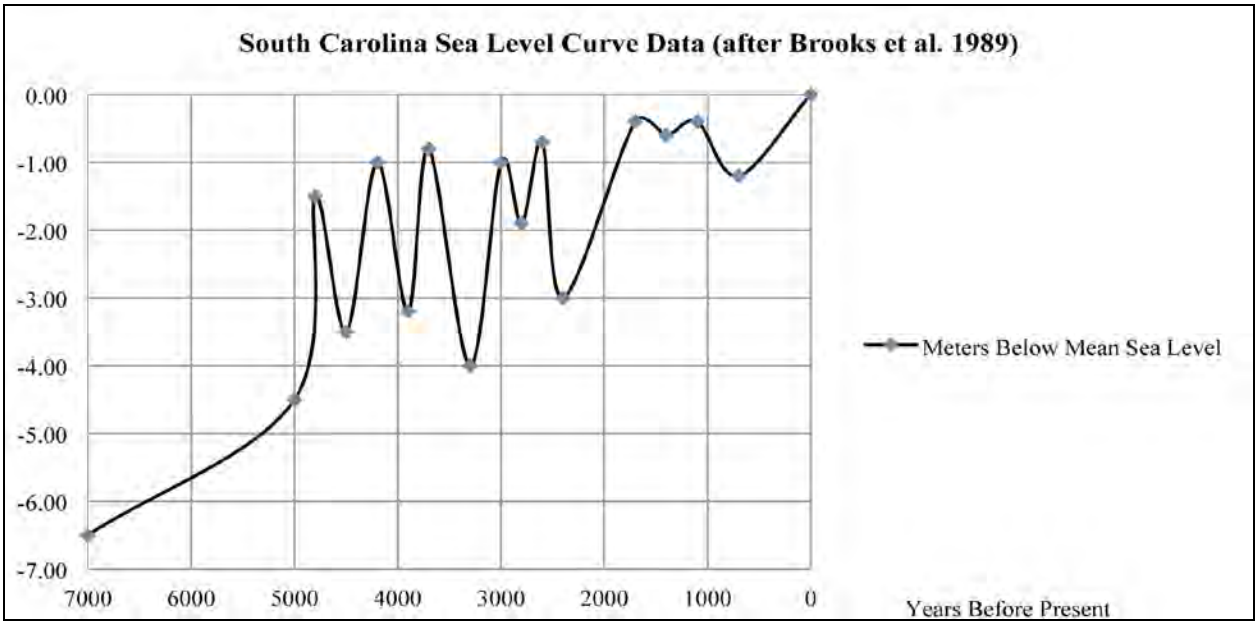


Figure 2.3 South Carolina sea level curve data (after Brooks et al. 1989).

As sea level rose to modern levels, it altered the gradients of major rivers and flooded near-coast river valleys, creating estuaries like Winyah Bay and Charleston Harbor. These estuaries became great centers for saltwater and freshwater resources, and thus population centers for human groups. Such dramatic changes affected any human groups living in the region.

The general warming trend that led to the melting of glacial ice and the rise in sea level also greatly affected vegetation communities in the Southeast. During the late Wisconsin glacial period, until about 12,000 years ago, boreal forest dominated by pine and spruce covered most of the Southeast. This forest changed from coniferous trees to deciduous trees by 10,000 years ago. Northern hardwoods such as beech, hemlock, and alder dominated the new deciduous forest, with oak and hickory beginning to increase in number.

With continuation of the general warming and drying trend, oak and hickory came to dominate, along with southern species of pine. Pollen data indicate that oak and hickory reached a peak at 7,000 to 5,000 years ago (Watts 1970, 1980; Whitehead 1965, 1973). Since then, the general climatic trend in the Southeast has been toward cooler and moister conditions, and the present Southern Mixed Hardwood Forest, as defined by Quarterman and Keever (1962), has become established.

Faunal communities also changed dramatically during this time. Several large mammal species (e.g., mammoth, mastodon, horse, camel, giant sloth) became extinct at the end of the glacial period, approximately 12,000 to 10,000 years ago. Pre-Contact human groups that had focused on hunting these large mammals readapted their strategy to the exploitation of smaller mammals, primarily deer in the Southeast.

2.2 Cultural Setting

The cultural history of North America generally is divided into three eras: Pre-Contact, Contact, and Post-Contact. The Pre-Contact era refers primarily to the Native American groups and cultures that were present for at least 10,000–12,000 years prior to the arrival of Europeans. The Contact era refers to the time of exploration and initial European settlement on the continent. The Post-Contact era refers to the time after the establishment of European settlements, when Native American populations usually were in rapid decline. Within these eras, finer temporal and cultural subdivisions have been defined to permit discussions of particular events and the lifeways of the peoples who inhabited North America at that time.

2.2.1 The Pre-Contact Era

In South Carolina, the Pre-Contact era is divided into four stages (after Willey and Phillips 1958). These include the Lithic, Archaic, Woodland, and Mississippian. Specific technologies and strategies for procuring resources define each of these stages, with approximate temporal limits also in place. Within each stage, with the exception of the Lithic stage, there are temporal periods that are defined on technological bases as well. A brief description of each stage follows, including discussions of the temporal periods within each stage. Readers are directed to Goodyear and Hanson (1989) for more detailed discussions of particular aspects of these stages and periods in South Carolina.

The Lithic Stage. The beginning of the human occupation of North America is unclear. For most of the twentieth century, archaeologists believed that humans arrived on the continent near the end of the last Pleistocene glaciation, termed the Wisconsinan in North America, a few centuries prior to 10,000 BC. The distinctive fluted projectile points and blade tool technology of the Paleoindians (described below) occurs throughout North America by this time. During the last few decades of the twentieth century, researchers began to encounter artifacts and deposits that predate the Paleoindian period at a number of sites in North and South America. To date, these sites are few in number. The most notable are Meadowcroft Rock Shelter in Pennsylvania (Adovasio et al. 1990; Carlisle and Adovasio 1982), Monte Verde in Chile (Dillehay 1989, 1997; Meltzer et al. 1997), Cactus Hill in Virginia (McAvoy and McAvoy 1999), and most recently, the Topper/Big Pine Tree site in Allendale County, South Carolina (Goodyear 1999). All of these sites contain artifacts in stratigraphic locales below Paleoindian deposits. Radiocarbon dates indicate occupations at the Meadowcroft and Topper/Big Pine Tree sites that are 10,000–20,000 years earlier than the earliest Paleoindian occupations. Cactus Hill produced evidence of a blade technology that predates Paleoindian sites by 2,000–3,000 years. Monte Verde produced radiocarbon dates comparable to North and South American Paleoindian sites but reflects a very different lithic technology than that evidenced at Paleoindian sites. Similarly, the lithic artifacts associated with the other pre-Paleoindian deposits discovered to date do not display the blade technology so evident during the succeeding period. Unfortunately, the numbers of artifacts recovered from these sites are too small at present to determine if they reflect a single technology or multiple approaches to lithic tool manufacture. Additional research at these and other sites will be necessary to determine how they relate to the better-known sites of the succeeding Paleoindian period, and how these early sites reflect the peopling of North America and the New World.

Paleoindian Period (10,000–8000 BC). An identifiable human presence in the South Carolina Coastal Plain began about 12,000 years ago with the movement of Paleoindian hunter-gatherers into the region. Initially, the Paleoindian period is marked by the presence of distinctive fluted projectile points and other tools manufactured on stone blades. Excavations at sites throughout North America have produced datable remains that indicate that these types of stone tools were in use by about 10,000 BC.

Goodyear et al. (1989) review the evidence for the Paleoindian occupation of South Carolina. Based on the distribution of the distinctive fluted spear points, they see the major sources of highly workable lithic raw materials as the principal determinant of Paleoindian site location, with a concentration of sites at the Fall Line possibly indicating a subsistence strategy of seasonal relocation between the Piedmont and Coastal Plain. Based on data from many sites excavated in western North America, Paleoindian groups generally were nomadic, with subsistence focusing on the hunting of large mammals, specifically the now-extinct mammoth, horse, camel, and giant bison. In the east, Paleoindians apparently hunted smaller animals than their western counterparts, although extinct species (such as bison, caribou, and mastodon) were routinely exploited where present. Paleoindian groups were probably small, kin-based bands of 50 or fewer persons. As the environment changed at the end of the Wisconsinan glaciation, Paleoindian groups had to adapt to new forest conditions in the Southeast and throughout North America.

The Archaic Stage. The Archaic stage represents the adaptation of southeastern Native Americans to Holocene environments. By 8000 BC, the forests had changed from sub-boreal types common during the Paleoindian period to more modern types. The Archaic stage is divided into three temporal periods: Early, Middle, and Late. Distinctive projectile point types serve as markers for each of these periods. Hunting and gathering was the predominant subsistence mode throughout the Archaic periods, although incipient use of cultigens probably occurred by the Late Archaic period. Also, the terminal Archaic witnessed the introduction of a new technology, namely, the manufacture and use of pottery.

Early Archaic Period (8000–6000 BC). The Early Archaic corresponds to the adaptation of native groups to Holocene conditions. The environment in coastal South Carolina during this period was still colder and moister than at present, and an oak-hickory forest was establishing itself on the Coastal Plain (Watts 1970, 1980; Whitehead 1965, 1973). The megafauna of the Pleistocene became extinct early in this period, and more typically modern woodland flora and fauna were established. The Early Archaic adaptation in the South Carolina Lower Coastal Plain is not clear, as Anderson and Logan (1981:13) report:

> At the present, very little is known about Early Archaic site distribution, although there is some suggestion that sites tend to occur along river terraces, with a decrease in occurrence away from this zone.

Early Archaic finds in the Lower Coastal Plain are typically corner- or side-notched projectile points, determined to be Early Archaic through excavation of sites in other areas of the Southeast (Claggett and Cable 1982; Coe 1964). Generally, Early Archaic sites are small, indicating a high degree of mobility.

Archaic groups probably moved within a regular territory on a seasonal basis; exploitation of wild plant and animal resources was well planned and scheduled. Anderson and Hanson (1988) developed a settlement model for the Early Archaic period (8000–6000 BC) in South Carolina involving movement of relatively small groups (bands) on a seasonal basis within major river drainages. The Charleston region is located within the range of the Saluda/Broad band. Anderson and Hanson (1988) hypothesize that Early Archaic use of the Lower Coastal Plain was limited to seasonal (springtime) foraging camps and logistic camps. Aggregation camps and winter base camps are suggested to have been near the Fall Line.

Middle and Preceramic Late Archaic Period (6000–2500 BC). The trends initiated in the Early Archaic, i.e., increased population and adaptation to local environments, continued through the Middle Archaic and Preceramic Late Archaic. Climatically, the region was still warming, and an oak-hickory forest dominated the coast until after 3000 BC, when pines became more prevalent (Watts 1970, 1980). Stemmed projectile points and ground stone artifacts characterize this period, and sites increased in size and density through the period.

Blanton and Sassaman (1989) recently reviewed the archaeological literature on the Middle Archaic period. They document an increased simplification of lithic technology during this period, with increased use of expedient, situational tools. Furthermore, they argue that the use of local lithic raw materials is characteristic of the Middle and Late Archaic periods. Blanton

and Sassaman (1989:68) conclude that "the data at hand suggest that Middle Archaic populations resorted to a pattern of adaptive flexibility as a response to 'mid-Holocene environmental conditions' such as variable precipitation, sea level rise, and differential vegetational succession." These processes resulted in changes in the types of resources available from year to year.

Ceramic Late Archaic Period (2500–1000 BC). By the end of the Late Archaic period, two developments occurred that changed human lifeways on the South Carolina Coastal Plain. Sea level rose to within one m of present levels and the extensive estuaries now present were established (Colquhoun et al. 1981). These estuaries were a reliable source of shellfish, and the Ceramic Late Archaic period saw the first documented emphasis on shellfish exploitation. It was also during this time that the first pottery appeared on the South Carolina coast. In the project region, this pottery is represented by the fiber-tempered Stallings series and the sand-tempered or untempered Thom's Creek series. Decorations include punctation, incising, finger pinching, and simple stamping.

The best-known Ceramic Late Archaic–period sites are shell rings, which occur frequently along tidal marshes. These are usually round or oval rings of shell and other artifacts, with a relatively sterile area in the center. Today, many of these rings are in tidal marsh waters. Some archaeologists have interpreted these sites as actual habitation loci adjacent to or within productive shellfish beds. More recent research suggests that these sites had some ceremonial function and represent monumental architecture along the Southeast Atlantic seaboard (Saunders 2002). These sites attest to a high degree of sedentism, at least seasonally, by Ceramic Late Archaic peoples.

The Woodland Stage. The Woodland stage is marked by the widespread use of pottery, with many new and regionally diverse types appearing and changes in the strategies and approaches to hunting and gathering. Native Americans appear to be living in smaller groups than during the preceding Ceramic Late Archaic period, but the overall population likely increased. The Woodland is divided into three temporal periods (Early, Middle, and Late) marked by distinctive pottery types. Also, there is an interval when Ceramic Late Archaic ceramic types and Early Woodland ceramic types were being manufactured at the same time, often on the same site (see Espenshade and Brockington 1989). It is unclear at present if these coeval types represent distinct individual populations, some of whom continued to practice Archaic lifeways, or technological concepts that lingered in some areas longer than in others.

Early Woodland Period (1500 BC–AD 200). In the Early Woodland period, the region was apparently an area of interaction between widespread ceramic decorative and manufacturing traditions. The paddle-stamping tradition dominated the decorative tradition to the south, and fabric impressing and cord marking dominated to the north and west (Blanton et al. 1986; Caldwell 1958; Espenshade and Brockington 1989).

The subsistence and settlement patterns of the Early Woodland period suggest population expansion and the movement of groups into areas minimally used in the earlier periods. Early and Middle Woodland sites are the most common on the South Carolina coast and generally consist of shell middens near tidal marshes along with ceramic and lithic scatters in a variety of

other environmental zones. It appears that group organization during this period was based on the semi-permanent occupation of shell midden sites with the short-term use of interior coastal strand sites.

Middle Woodland Period (200 BC–AD 500). The extreme sea level fluctuations that marked the Ceramic Late Archaic and Early Woodland periods ceased during the Middle Woodland period. The Middle Woodland period began as sea level rose from a significant low stand at 300 BC, and for the majority of the period the sea level remained within one meter of current levels (Brooks et al. 1989). The comments of Brooks et al. (1989:95) are pertinent in describing the changes in settlement:

> It is apparent that a generally rising sea level, and corresponding estuarine expansion, caused an increased dispersion of some resources (e.g., small inter-tidal oyster beds in the expanding tidal creek network…). This hypothesized change in the structure of the subsistence resource base may partially explain why these sites tend to be correspondingly smaller, more numerous, and more dispersed through time.

Survey and testing data from a number of sites in the region clearly indicate that Middle Woodland–period sites are the most frequently encountered throughout the region. These sites include small, single-house shell middens, larger shell middens, and a wide variety of shell-less sites of varying size and density in the interior. The present data from the region suggest seasonal mobility, with certain locations revisited on a regular basis (e.g., 38GE46 [Espenshade and Brockington 1989]). Subsistence remains indicate that oysters and estuarine fish were major faunal contributors, while hickory nut and acorn have been recovered from ethnobotanical samples (Drucker and Jackson 1984; Espenshade and Brockington 1989; Trinkley 1976, 1980).

The Middle Woodland period witnessed increased regional interaction and saw the incorporation of extra-local ceramic decorative modes into the established Deptford technological tradition. As Caldwell (1958) first suggested, the period apparently saw the expansion and subsequent interaction of groups of different regional traditions (Espenshade 1986, 1990).

Late Woodland Period (AD 500–1100). The nature of Late Woodland adaptation in the region is unclear due to a general lack of excavations of Late Woodland components, but Trinkley (1989:84) offers this summary:

> In many respects the South Carolina Late Woodland may be characterized as a continuation of previous Middle Woodland cultural assemblages. While outside the Carolinas there were major cultural changes, such as the continued development and elaboration of agriculture, the Carolina groups settled into a lifeway not appreciably different from that observed for the past 500 to 700 years.

The Late Woodland represents the most stable Pre-Contact period in terms of sea level change, with sea level for the entire period between 1.31 and 1.97 ft below the present high marsh surface (Brooks et al. 1989). It would be expected that this general stability in climate and

sea level would result in a well-entrenched settlement pattern, but the data are not available to address this expectation. In fact, the recognition/interpretation of Late Woodland adaptations in the region has been somewhat hindered by past typological problems.

Overall, the Late Woodland is noteworthy for its lack of check-stamped pottery. However, somewhat recent investigations by Poplin et al. (2003) indicate that the limestone-tempered Wando series found along the Wando and Cooper Rivers near Charleston Harbor displays all of the Middle Woodland decorative elements including check stamping but appears to have been manufactured between AD 700 and 1000. Excavations at the Buck Hall Site (38CH644) in the Francis Marion National Forest suggest that McClellanville and Santee ceramic types were employed between AD 500 and 900 and represent the dominant ceramic assemblages of this period (Poplin et al. 1993).

The sea level change at this time caused major shifts in settlement and subsistence patterns. The rising sea level and estuary expansion caused an increase in the dispersal of resources such as oyster beds, and thus corresponding increase in the dispersal of sites. Semi-permanent shell midden sites continue to be common in this period, although overall site frequency appears to be lower than in the Early Woodland. Instead, there appears to be an increase in short-term occupations along the tidal marshes. Espenshade et al. (1994) state that at many of the sites postdating the Early Woodland period, the intact shell deposits appear to represent short-term activity areas rather than permanent or semi-permanent habitations.

The Mississippian Stage. Approximately 1,000 years ago, Native American cultures in much of the Southeast began a marked shift away from the settlement and subsistence practices common during the Woodland periods. Some settlements became quite large, often incorporating temple mounds or plazas. The use of tropical cultigens (e.g., corn and beans) became more common. Hierarchical societies developed, and technological, decorative, and presumably religious ideas spread throughout the Southeast, supplanting what had been distinct regional traditions in many areas. In coastal South Carolina, the Mississippian stage is divided into two temporal periods, Early and Late. Previous sequences for the region separated Mississippian ceramic types into three periods (Early, Middle, and Late), following sequences developed in other portions of the Southeast. However, a simpler characterization of the technological advancements made between AD 1000 and 1500 appears more appropriate. During these centuries, the decorative techniques that characterize the Early Mississippian period slowly evolved without the appearance of distinctly new ceramic types until the Late Mississippian.

Early Mississippian Period (AD 1100–1400). In much of the Southeast, the Mississippian stage is marked by major mound ceremonialism, regional redistribution of goods, chiefdoms, and maize horticulture as a major subsistence activity. It is unclear how early and to what extent similar developments occurred in coastal South Carolina. The ethnohistoric record, discussed in greater detail below, certainly indicates that seasonal villages and maize horticulture were present in the area, and that significant mound centers were present in the interior Coastal Plain to the north and west (Anderson 1989; DePratter 1989; Ferguson 1971, 1975).

Distinct Mississippian ceramic phases are recognized for the region (Anderson et al. 1982; Anderson 1989). In coastal South Carolina, the Early Mississippian period is marked by

the presence of Jeremy Phase (AD 1100–1400) ceramics, including Savannah Complicated Stamped, Savannah Check Stamped, and Mississippian Burnished Plain types. By the end of the Late Woodland period, cord-marked and fabric-impressed decorations are replaced by complicated stamped decorations. Anderson (1989:115) notes, "characteristically Mississippian complicated stamped ceramics do not appear until at least AD 1100, and probably not until as late as AD 1200, over much of the South Carolina area." Poplin et al.'s (1993) excavations at the Buck Hall Site (38CH644) produced radiocarbon dates around AD 1000 for complicated-stamped ceramics similar to the Savannah series. This represents the earliest date for complicated-stamped wares in the region and may indicate an earlier appearance of Mississippian types than previously assumed.

Sites of the period in the region include shell middens, sites with apparent multiple- and single-house shell middens, and oyster processing sites (e.g., 38CH644 [Poplin et al. 1993]). Adaptation during this period apparently saw a continuation of the generalized Woodland hunting-gathering-fishing economy, with perhaps a growing importance on horticulture and storable foodstuffs. Anderson (1989) suggests that environmental unpredictability premised the organization of hierarchical chiefdoms in the Southeast beginning in the Early Mississippian period; the redistribution of stored goods (i.e., tribute) probably played an important role in the Mississippian social system. Maize was recovered from a feature suggested to date to the Early Mississippian period from Site 38BK226, near St. Stephen (Anderson et al. 1982:346).

Late Mississippian Period (AD 1400–1550). During this period, the regional chiefdoms apparently realigned, shifting away from the Savannah River centers to those located in the Oconee River basin and the Wateree-Congaree basin. As in the Early Mississippian, the Charleston Harbor area apparently lacked any mound centers, although a large Mississippian settlement was present on the Ashley River that may have been a "moundless" ceremonial center (South 2002). Regardless, it appears that the region was well removed from the core of Cofitachequi, the primary chiefdom to the interior (Anderson 1989; DePratter 1989). DePratter (1989:150) specifies:

> The absence of 16th century mound sites in the upper Santee River valley would seem to indicate that there were no large population centers there. Any attempt to extend the limits of Cofitachequi even farther south and southeast to the coast is pure speculation that goes counter to the sparse evidence available.

Pee Dee Incised and Complicated Stamped, Irene Incised and Complicated Stamped, and Mississippian Burnished Plain ceramics mark the Late Mississippian period. Simple-stamped, cord-marked, and check-stamped pottery apparently was not produced in this period.

2.2.2 The Contact Era

The Contact era begins in South Carolina with the first Spanish explorations into the region in the 1520s. Native American groups encountered by the European explorers and settlers probably were living in a manner quite similar to the late Pre-Contact Mississippian groups identified in archaeological sites throughout the Southeast. Indeed, the highly structured Native American society of Cofitachequi, formerly located in central South Carolina and visited by Hernando de Soto in 1540, represents an excellent example of the Mississippian social organizations present

throughout southeastern North America during the late Pre-Contact period (Anderson 1985). However, the initial European forays into the Southeast contributed to the disintegration and collapse of the aboriginal Mississippian social structures; disease, warfare, and European slave raids all contributed to the rapid decline of the regional Native American populations during the sixteenth century (Dobyns 1983; Ramenofsky 1982; Smith 1984). By the late seventeenth century, Native American groups in coastal South Carolina apparently lived in small, politically and socially autonomous, semi-sedentary groups (Waddell 1980). By the middle eighteenth century, very few Native Americans remained in the region; all had been displaced or annihilated by the ever-expanding English colonial settlement of the Carolinas (Bull 1770, cited in Anderson and Logan 1981:24-25).

The ethnohistoric record from coastal South Carolina suggests that the Contact-era groups of the region followed a seasonal pattern that included summer aggregation in villages for planting and harvesting domesticates, and dispersal into one- to three-family settlements for the remainder of the year (Rogel 1570 [in Waddell 1980:147-151]). This coastal adaptation is apparently very similar to the Guale pattern of the Georgia coast, as reconstructed by Crook (1986:18). Specific accounts of the Contact-era groups of the region, the Sewee and the Santee, have been summarized by Waddell (1980). It appears that both groups included horticultural production within their seasonal round but did not have permanent, year-round villages. Trinkley (1981) suggests that Sewee groups produced a late variety of Pee Dee ceramics in the region; this late variety may correspond to the Ashley ware initially described by South (1973, 2002; see also Anderson et al. 1982). Recent excavations at 38BK1633 on Daniel Island exposed the remnants of a Contact-era hamlet or farmstead. Ashley Complicated Stamped, Cob Marked, and Line Block Stamped ceramics dominate the assemblage. The site contains portions of three separate houses, a probable corncrib, and large fire/refuse pits. Substantial volumes of animal bone and ethnobotanical remains occur in these pits, including charred corncobs and peach pits.

Waddell (1980) identified 19 distinct groups between the mouth of the Santee River and the mouth of the Savannah River in the middle of the sixteenth century. Anderson and Logan (1981:29) suggest that many of these groups probably were controlled by Cofitachequi, the dominant Mississippian center/polity in South Carolina, prior to its collapse. By the seventeenth century, all were independently organized. These groups included the Coosaw, Kiawah, Etiwan, and Sewee “tribes” near the Charleston peninsula. The Coosaw inhabited the area to the north and west along the Ashley River. The Kiawah were apparently residing at Albemarle Point and along the lower reaches of the Ashley River in 1670, but gave their settlement to the English colonists and moved to Kiawah Island; in the early eighteenth century they moved south of Combahee River (Swanton 1952:96). The Etiwans were mainly settled on or near Daniel Island to the northeast of Charleston, but their range extended to the head of the Cooper River. The territory of the Sewee met the territory of the Etiwan high up the Cooper, and extended to the north as far as the Santee River (Orvin 1973:14). Mortier’s map of Carolina, prepared in 1696, shows the Sampas (Sompa) between the Cooper and Wando Rivers, to the northeast of Daniel Island, and the Wando tribe and Sewel [*sic*] tribe fort east of the Wando River, northeast of Daniel Island (St. Thomas Isle).

2.2.3 The Post-Contact Era

The history of the project area recounts elements of several themes prevalent in the history of the South Carolina Lowcountry. Early proprietary land policy, development of commercially viable inland rice, the rise of an elite planter-merchant class, the growth of the African American slave labor system, development of cotton production, postbellum phosphate mining and fertilizer production, the increase in tenant farming, and timber and silviculture growth all play a role in defining the use of the land over the last three centuries. The following discussion looks at these themes from a regional and local perspective. For more information on the development of the area, see Bell (1995), Bremer (1977), Cox (1969), Edgar (1998), Power and Fay (2005), Walker (1978), and Weir (1983).

Introduction. In 1696, Congregationalists from Dorchester, Massachusetts moved south and established the new town of Dorchester on the Ashley River. Although Dorchester was abandoned by 1788, the parish in which it was located continued to be referred to as St. George Dorchester. This name was subsequently adopted for the county when it was formed from parts of Colleton and Berkeley Counties in 1897. After initial settlement along the coast at places like Charles Town and Port Royal, many of the best lands in the Lowcountry were taken. Thus, colonists seeking new and open lands for farms and cattle ranges moved up the rivers into the immediate hinterlands of the Lower Coastal Plain.

The Lowcountry hinterlands of the Lower Coastal plain have remained predominantly rural and agricultural since their earliest settlement in the late seventeenth and early eighteenth centuries. By the late eighteenth century and extending into the mid-nineteenth century, rice was the dominant crop, particularly along the region's tidal rivers. Timber companies began buying vast properties in the late nineteenth and early twentieth centuries, covering the land in planted pine trees. The subject counties, and the Lowcountry hinterlands in general, have received little attention in published histories. Poplin et al. (2001) and Fick and Davis (1997) developed an overview for the area. This work draws upon these sources.

Initial European Incursions. Initial European exploration of coastal South Carolina occurred during the early sixteenth century. Indian groups encountered by the European explorers and settlers probably were living in a way that was very similar to the late prehistoric Mississippian groups identified in archaeological sites throughout the Southeast. Indeed, the highly structured Indian society of Cofitachequi, formerly located in central South Carolina and visited by De Soto in 1540, is an excellent example of the Mississippian social organizations present throughout southeastern North America during the late Pre-Contact period (Anderson 1985). Initial European forays into the Southeast led to the disintegration and collapse of the aboriginal Mississippian social structures; disease, warfare, and European slave raids contributed to the rapid decline of the regional Indian populations during the sixteenth century (Dobyns 1983; Ramenofsky 1982; Smith 1984). By the late seventeenth century, Indian groups in coastal South Carolina apparently lived in small, politically and socially autonomous semi-sedentary groups (Waddell 1980). By the middle to late eighteenth century, very few Indians remained in the region; all were displaced or annihilated by the rapidly expanding English colonial settlement of the Carolinas (Anderson and Logan 1981:24-25).

Early Settlement. European colonization into South Carolina began with temporary Spanish and French settlements in the Beaufort area during the sixteenth century. The English, however, were the first Europeans to establish permanent colonies. In 1663, King Charles II made a proprietary grant to a group of powerful English courtiers who had supported his return to the throne in 1660, and who sought to profit from the sale of the new lands. These Lords Proprietors, including Sir John Colleton, Sir William Berkeley, and Sir Anthony Ashley Cooper, provided the basic rules of governance for the new colony. They also sought to encourage settlers, many of whom came from the overcrowded island of Barbados in the early years. These Englishmen from Barbados first settled at Albemarle Point on the west bank of the Ashley River in 1670. By 1680, they moved their town down the river to Oyster Point, the present location of Charleston, and called it Charles Towne. These initial settlers, and more who followed them, quickly spread along the central South Carolina coast. By the second decade of the eighteenth century, they had established settlements from the Port Royal Harbor in Beaufort County northward to the Santee River in Georgetown County.

The colony's early settlements grew slowly, and despite its geographic spread, the South Carolina Lowcountry contained only around 5,000 European and African American inhabitants in 1700. The earliest South Carolina economy centered around naval stores production, beef and pork production, and trade with the Native American population. However, by the end of the seventeenth century the colonists had begun to experiment with rice cultivation. The regular flood conditions of the immediate tidal area proved valuable, and production for export increased rapidly. By 1715, Charles Towne exported more than 8,000 barrels of rice annually; this number increased to 40,000 by the 1730s. In the 1740s, Lowcountry residents began to experiment with growing and processing indigo, a blue dye that was very popular in Europe and became one of South Carolina's principal exports during the eighteenth century. Both indigo and rice were labor-intensive, and laid the basis for South Carolina's dependence on African slave labor, much as tobacco had done in the Virginia colony (Coclanis 1989; Wood 1974).

Angered by mistreatment from traders and encroachments on their land, Native Americans throughout the colony attacked in the Yamasee War of 1715, but did not succeed in dislodging the English (Covington 1978:12). While the Yamasee staged a number of successful raids through the 1720s, by 1728 the English had routed them and made the area more accessible for renewed settlement. With the rapidly increasing wealth in the South Carolina Lowcountry, and with the Yamasee War largely behind them, the population began to swell. By 1730 the colony had 30,000 residents, at least half of whom were black slaves. A 1755 magazine, cited by Peter Wood, estimates that South Carolina residents had imported over 32,000 slaves by 1723 (Wood 1974:151). The growing population increased pressure for territorial expansion, which was compounded by the growing black majority in the Lowcountry. Fears of a slave rebellion, along with continuing fears of attack from Native Americans, led Charles Towne residents to encourage settlement in the backcountry.

Colonial South Carolina. The capacity of the Lords Proprietors to govern the colony effectively declined in the early years of the eighteenth century. Governance under the Lords Proprietors became increasingly arbitrary, while wars with the Native population arose and the colonial currency went into steep depreciation. According to a historian of colonial South Carolina, "proprietary attitudes and behavior…convinced many of the dissenters – who at one time had

composed the most loyal faction – that the crown was a more reliable source of protection against arbitrary rule" (Weir 1983:94). South Carolina's legislature sent a petition to Parliament in 1719, requesting that royal rule supplant that of the Lords Proprietors. After several years in limbo, South Carolinians received a degree of certainty in 1729 when the crown purchased the Proprietors' interests, and in 1730 when the new royal governor, Robert Johnson, arrived in the colony.

Johnson arrived with a plan to create townships throughout the colony, as a way to ensure the orderly settlement of the backcountry. His scheme originally included nine townships, primarily along the major rivers. Of these, the main settlements were Kingston along the Waccamaw, Williamsburg and Amelia on the Santee, Fredericksburg along the Wateree, Queensborough on the Pee Dee, and Saxe Gotha on the Congaree. Johnson permitted the settlement of these areas on the headright system, which apportioned 50 acres of land to every individual who settled there. Many of these settlers established plantations that were directed toward the production of cash crops. Main plantation residences and facilities were established on the low bluffs of the rivers, near readily accessible river landings. However, settlement proceeded slowly until the 1750s when the South Carolina backcountry population was approximately 20,000, about one-third of the total Lowcountry population (Wallace 1961).

The colony was organized with the parish as the local unit of government. St. George's Dorchester Parish was created by the Colonial Assembly in 1717. St. George's Dorchester Parish Church was erected the same year (Edgar and Bailey 1977:618, 730). The church was located in the town of Dorchester on the north bank of the Ashley River. The parish church building served both religious and political purposes. As Gregorie (1961:5) explains, "The parish church as a public building was to be the center for the administration of some local government in each parish, for at that time there was not a courthouse in the province, not even in Charleston."

St. George's Parish became one of the wealthiest parishes in South Carolina in the eighteenth century. Early settlers located along the Ashley River quickly staked out claims to inland swamp lands as they became aware of the potential to grow rice in the moist soils. By 1750, the Izard, Blake, Baker, Cantey, Wragg, Middleton, Stevens, Walter, and Waring families built sizable inland rice plantations in the parish. Early planters made their town homes usually in Charles Towne, though many had houses in Dorchester. They became vast slave owners, and as early as 1720, St. George's Dorchester had the highest slave-to-granted-acre population of all the parishes in the colony except St. Philips (Charles Towne) (Waterhouse 1989:132). Throughout the colonial period, St. George's Dorchester Parish was represented in the House of Assemblies by one of the wealthiest groups in the colony. The average assemblyman from St. George's Parish owned 137 slaves and was worth £8,691 sterling, making it second only to Charles Towne (Waterhouse 1989:175).

Some of the oldest road systems began as Native American trails that European traders adopted and improved, but others were built by colonists to connect bridges or ferries to existing roads. Slaves often provided the labor for road construction and labor (Fick and Davis 1997:16). An act ratified on September 15, 1721 appointed Captain Walter Izard, William Sanders, and Benjamin Izard road commissioners for building a road from Dorchester Road (SC Route 642) to Izard's Cow Pen. Another act confirmed on March 5, 1737 assigned Abraham Dupont, John

Hyrne, James Coachman, Benjamin Izard, and Peter May as commissioners for laying out an extension to the road mentioned above. The expansion led from Izard's Cow Pen to Orangeburg and became known as Orangeburg Road. A 1753 act first authorized the construction on a causeway and bridge across Four Holes Swamp on Orangeburg Road. Disputes arose between appointed commissioners, and they did not build the bridge. In 1770, a new act repealed the 1753 act. The 1770 act called for St. George's Parish Commissioners to build a public bridge; travelers began using this new bridge in 1780. Male inhabitants age 16 to 60 years old who resided within two miles of the road handled the upkeep of the bridge. The upkeep became too expensive for the men, and the public bridge thus became a toll bridge (Fick and Davis 1997:17; Walker 1978:225).

Despite this swelling population in the backcountry, all important judicial functions were handled in Charleston, the seat of colonial authority. By the 1760s, population growth and limited judicial facilities combined to generate severe lawlessness and discontent in the backcountry. The Regulator Movement arose in response. This movement called for more local courts and for a vigilante response to the banditry (King 1981:8-10). In response to the violence and counter-violence in the backcountry, colonial authorities in Charleston agreed to set up a series of judicial districts through the area. In 1769, the governor authorized seven districts throughout the colony.

The early settlers focused on subsistence agriculture, though they soon began to produce for export. The colonists also began to experiment with rice cultivation by the end of the seventeenth century. The regular flood conditions of the immediate tidal area proved valuable, and production for export increased rapidly. By 1715, Charles Towne exported more than 8,000 barrels of rice annually; this number increased to 40,000 by the 1730s. In addition, planters in the Lowcountry began in the 1740s to experiment with growing and processing indigo. This plant produced a blue dye that was very popular in Europe, and became one of South Carolina's principal exports during the eighteenth century. Indigo was first grown in the colony in 1740, and its introduction to the colony is traditionally attributed to the Pinckney family. In 1744, the Pinckneys gave small quantities of the seed to many of the local planters and, spurred by the successful cultivation efforts of Eliza Pinckney, indigo soon became a common and very profitable crop. Some planters were able to double their capital every three to four years. The volume of exports reached its peak in 1755 when 303,531 pounds of indigo blocks were exported from Charleston. England was the major market for indigo grown and processed in South Carolina, and the industry declined after the American Revolution (Pinckney 1976).

Revolution. The colonies declared their independence from Britain in 1776 following several years of increasing tension over taxation and trade restrictions imposed on them by the British Parliament. South Carolinians were divided during the war, although most citizens ultimately supported the American cause. Those individuals who remained loyal to the British government tended to reside in Charleston or in certain enclaves within the interior of the province (Edgar and Bailey 1977).

Britain's Royal Navy attacked Fort Sullivan (later renamed Fort Moultrie) near Charleston in 1776 but failed to take the fort. The defeat bolstered the morale of American revolutionaries throughout the colonies, and for four years the Lowcountry was quiet (Lumpkin

1981:42-46). The British returned to the low colonies in 1778, however, besieging and capturing Savannah late in December. British General Henry Clinton believed that the southern colonies were more loyal to the British Empire, and that political division could be exploited (Mattern 1995:91; Weigley 1973:24). A major British expeditionary force landed on Seabrook Island in the winter of 1780, and then marched north and east to invade Charleston from its landward approaches (Lumpkin 1981:42-46). Clinton's forces were large, including 10,000 men and a support fleet commanded by Admiral Marriot Arbuthnot (Alden 1957:239). After its fall, Charleston subsequently became a base of operations for British campaigns into the interior of South Carolina, Georgia, and North Carolina.

On 14 October 1780, General Nathanael Greene succeeded General Gates as Commander in Chief of the Southern Army (Matloff 1969:90-93). During Greene's campaign in the interior of the colony, several military actions occurred in the project area and specifically at the bridge at Four Holes Swamp in 1781 and 1782. On 8 April 1781, Colonel William Harden of the Georgia Militia, with 70 to 100 mounted men, surprised and captured 26 Loyalists including Captain John Barton. The next day, Major George Cooper, one of Harden's subordinates, assaulted Barton's post. The combat was minimal, and Barton surrendered to Cooper. The Americans suffered losses of one killed and two wounded; the Loyalists had one killed, three wounded, and three taken prisoner. The exact location of this incident was not determined (Ripley 1983:154).

In response to the Patriot siege of Ninety Six, British Colonel Francis Rawdon, regimental commander of the Volunteers of Ireland, left Charleston with his forces to break the siege (Gordon 2003:156-157). He crossed Four Holes Creek at the bridge on 12 June 1871. Later that day, Rawdon and his forces arrived in Orangeburg. In a letter to Greene on 15 June, Colonel Thomas Sumter reported that Rawdon's movement was slow and that there were still British dragoons at Orangeburg and some more infantry a few miles behind them. Seeing an opportunity because of Rawdon's slow movement, Greene ordered forces under Andrew Pickens and William Washington to slow Rawdon's column (Gordon 2003:156-157). This style of fighting that included the targeting of a slower, large conventional force by quicker, smaller forces characterized Greene's strategy in the war.

Francis Rawdon, the leader of the British forces that moved through the project area, was an important British military figure. Rawdon was born in County Down, the son of John Rawdon, First Earl of Moira, and Elizabeth Hastings, Baroness Hastings. He joined the British army in 1771 and served at the battles of Bunker Hill, Brooklyn, White Plains, Monmouth and Camden, at the attacks on Forts Washington and Clinton, and at the siege of Charleston. Military historians indicate that his most important military achievement was the organization of a corps at Philadelphia, called the Irish Volunteers. The force was significant in the British victory at Hobkirk's Hill, South Carolina. In 1781, Rawdon was injured and returned to England. After the war, in 1813, Rawdon was appointed Governor-General of India, where he led the British in victory during the Gurkha War (1814–1816), in the final conquest of the Marathas in 1818, and in the purchase of the island of Singapore in 1819. His domestic policy in India was largely successful, leading to the repair of the Mogul canal system in Delhi as well as educational and administrative reforms. He was raised to the rank of Marquess of Hastings in 1817. Hastings'

tenure in India ended due to a financial scandal in 1823; he returned to England and was appointed Governor-General of Malta in 1824 (*Encyclopedia Britannica* 1911).

After the unsuccessful American siege of Ninety Six, Rawdon's force returned to Charleston, and Greene returned his forces to the interior of South Carolina. With the arrival of the American regular army with their supplies and reinforcements, partisans began to attack British outposts more regularly (Gordon 2003:159). On June 16, 1781, Francis Marion ordered Colonel Peter Horry to suppress the Loyalists on the Pee Dee and sent Major Hezekiah Maham to attack some Loyalists collecting at Four Holes Swamp. Upon Rawdon's removal as the British commander, Lieutenant Colonel Alexander Stewart took command of the British forces. On June 29, 1781, Stewart and elements of the Third Regiment camped next to Four Holes Bridge (Gordon 2003:159).

The following month, July 1781, Greene expanded his partisan fight against the British forces in South Carolina. He ordered Sumter to harass the British forces in and around Charleston. However, Sumter did not have the forces to fight a major engagement with the British directly, so he carried out four separate raids in conjunction with attacks against Lieutenant Colonel James Coates and elements of the 19th Foot Regiment at Monck's Corner and Biggin Church. The Patriot raids targeted British forces at Dorchester, Four Holes Bridge, Goose Creek, and Wadboo Bridge. The basic purpose of these raids was to cut off Coates' retreat from Monck's Corner (Gordon 2003:160-161).

Patriot dragoons under Colonel Henry Hampton of Sumter's Brigade conducted the raid at Four Holes Bridge. Hampton was sent to seize Four Holes Bridge on the north fork of the Edisto. He succeeded in taking the bridge, which was unoccupied and remained there for a short time. Impatient, he rode on to join his brother Colonel Wade Hampton, who was riding down toward Goose Creek and the outskirts of Charleston. Finally, after the American victory at Yorktown and the renewed American offense in South Carolina, General Sumter posted men at Orangeburg and Four Holes Swamp in December 1781 to cut off communication between the Tories and the British army (Gibbes 1972:221).

The Antebellum Period. The period between the close of the American Revolution and the beginning of the Civil War was characterized in South Carolina and throughout the South by plantation agriculture based on slave labor and the production of staple crops such as cotton and rice. It was also a period of increasing sectional tensions, with Southerners emphasizing the political expedience of states' rights, nullification, and agricultural expansion as means to protect their slave-based society.

In the wake of the Revolutionary War, indigo waned quickly as an important crop throughout the state, while Sea Island planters were beginning their experiments with long staple cotton. Rice provided a degree of economic continuity for various parts of the Lowcountry after the war. It had grown quickly during the eighteenth century in its importance to the Lowcountry's economy, and with the development of new technologies, rice cultivation increased still further. By the late eighteenth century some planters began to experiment with another new technology, which relied on the power of tides to raise river levels; this inundated crops with fresh water that would kill off the weeds. A series of elaborate canals, dikes, and gates

kept the salt water out of the fields. In order to do this, the process of radically altering the landscape was expanded as lands along the tidal rivers were drained, canals were built, and fields were surrounded by levies to control their access to the water (Chaplin 1993:227-276) At the same time, this placed a high priority on geography, for only some rivers had tides strong enough to force tidal action up into the fresh water sections of the rivers.

Duncan Clinch Heyward (1993:18-20), the fifth generation of his family to plant rice in the Lowcountry, gave a useful description of the process and the difficulties of clearing the swamps in his 1937 memoirs:

> There were many large white gum, cedar, and cypress trees, and the dark alluvial soil was so soft that one could scarcely walk any distance upon it. To avoid sinking he would have to step from one root to another, or trust his weight to some treacherous tussock. Everywhere his progress was impeded by dense undergrowth, and his clothes and flesh torn by briars…The first step in reclaiming the swamp lands was to build a bank along the edge of the river, with both ends joined to strips of highland where they approached the river's edge, and through the bank to place trunks, similar to those used in the inland swamps, for the water to pass through. When the bank had been built and the trunks installed, the digging of the canals and ditches in the swamp followed. Then the trees and undergrowth had to be removed, the greatest undertaking of all. The trees were cut down and burned, but their stumps were never completely removed.

The result was a distinctive landscape, which maps from the late eighteenth and nineteenth centuries capture. Plats of rice plantations from this period show a series of buildings, including rice machines, slave cabins, and the main house, that seem to be minor features in the midst of the pattern of rice canals and dams.

With Eli Whitney's invention of the cotton gin on a Savannah River plantation in 1793, cotton superseded rice as the South's most important cash crop. Rice remained an important crop along the major fresh water swamps and rivers of portions of the Lowcountry that were affected by the tides, while cotton flourished in the uplands. Mills' (1825; 1979 reprint) map of Colleton District shows the area's rivers, creeks, and swamps crisscrossed by an expanding network of canals, ferry crossings, highways, and post roads. The Sea Islands along the coast were completely devoted to the cultivation of long staple cotton.

Rice and cotton agriculture drove the economy of St. George's Parish during the first half of the nineteenth century until the Civil War. However, the Ashley River region began to decline in importance in the years after 1820. By the 1840s, William Ruffin noted that the lands in St. George's Parish were "almost left untilled, are rarely inhabited by the proprietors…& the whole represents a melancholy scene of abandonment, desolation & ruin" (Mathew 1992:78). Ruffin went on to say that great houses were falling into ruin, and estates were easy to obtain as the land sold frequently, "though the continued & great decline of value makes every successive sale at a lower rate than the preceding" (Mathew 1992:78).

Railroads came into increasing prominence in South Carolina during the antebellum period. The South Carolina Canal and Railroad Company planned a rail line extending from Charleston to Hamburg, a town on the Savannah River near Aiken. The plan was to siphon to Charleston the plantation commerce that would normally travel down the Savannah River to the port of Savannah. In 1832, the section of the railroad from Charleston to Branchville, a traditional travel junction in southern Orangeburg District, was completed. This section passed through Dorchester County, traveling along what is now US Route 78 and through the town of St. George. The final section, from Branchville to Aiken, was completed in 1833. When finished, the South Carolina Railroad was the longest in the world at 136 miles (Culler 1995:90). The section from Branchville to Orangeburg was completed in 1840, and the line to Columbia was finished in 1842 (Culler 1995:90).

Civil War (1861–1865). Although the Civil War brought extensive battles to Charleston, there were no major battles in the project area. The main impact of the war was complete social and economic upheaval throughout the project area. Intermittent raids by Union troops resulted in the loss of food, seed, and livestock. The end of the Civil War in 1865 and the emancipation of the slaves completed the destruction of the plantation system along the Ashley River. Additionally, the dissection and redistribution of some of the plantations at the end of the war effectively destroyed the plantation system of production in South Carolina and throughout the South.

In October 1863, Confederate Captain Robert Barnwell made a reconnaissance of the area from the South Carolina Railroad Bridge across the Edisto to Ridgeville. He stated in a report to Major General J. F. Gilmer that the key to the defense of the railroad was the bridge over the Edisto River. He suggested a defense line including two companies of infantry at the railroad bridge, two companies of infantry at Raysor's Bridge, and two companies of infantry at Four Holes Bridge, over Four Holes Swamp (*The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*. [*OR*] 1901: Series 1, Vol. 28, Part 2:447).

On January 3, 1865, General Sherman prepared for his march into the interior of South Carolina by sending a portion of his troops to Beaufort, South Carolina, from Savannah. Along the way, they encountered resistance at Hardeeville, South Carolina. A portion of Sherman's men then traveled to Pocotaligo, South Carolina, on January 14, 1865. Five days later, on January 19, 1865, Sherman ordered his entire army to march into South Carolina. However, foul weather slowed the progress of the columns. As his forces moved into the state, Sherman first sent an expeditionary force toward Charleston in the hope of buttoning down the forces in the city. Sherman stated in a report to General Ulysses S. Grant that:

> On the 25th a demonstration was made against the Combahee Ferry and railroad bridge across the Salkehatchie, merely to amuse the enemy, who had evidently adopted that river as his defensive line against our supposed objective, the city of Charleston. I reconnoitered the line in person, and saw that the heavy rains had swollen the river so that water stood in the swamps for a breadth of more than a mile, at a depth of from one to twenty feet. Not having the remotest intention of approaching Charleston, a comparatively small force was able, by seeming

> preparations to cross over, to keep in their front a considerable force of the enemy disposed to contest our advance on Charleston (*OR* 1901:I(47):18).

Sensing that Sherman's force might attack Charleston from the north, in January 1865, an unknown Confederate commander recommended that the Four Holes Bridge and surrounding area be strengthened. He argued that if overwhelmed, the defenders could quickly put themselves west of Four Holes Swamp and use the swamp as a natural defense (*OR* Series 1, Vol. 47, Part 2:1076). Confederate General P. G. T. Beauregard ordered Lieutenant General W.J. Hardee, Commander of the Department of Charleston, to "hold enemy in check behind Four Hole Swamp and Sandy Run to the Santee, and effectively guard crossings of that river to the Westeree, or enemy may reach Northeastern Railroad before your movement" (*OR* Series 1, Vol. 47, Part 2:1167).

The defense of the Four Holes Swamp area turned out to be important. On February 10, 1865, Lieutenant General Hardee ordered Major General Stevenson to send the part of Stevenson's forces commanded by Lafayette McLaws to Four Holes Swamp by rail (*OR* Series 1, Vol. 47, Part 2:1144). One Union intelligence report dated February 14, 1865 stated that Conner's brigade (1,500 strong) of Longstreet's corps had been guarding a bridge over Four Holes Swamp to counter any Union advance on Charleston from Orangeburg (*OR* Series 1, Vol. 47, Part 2:418). However, the Confederate forces were overwhelmed all along their defense line; Sherman marched to Columbia, and Union forces gained control of Summerville and Orangeburg and the areas between.

On May 7, 1865, a Union brigade moved from Charleston and camped in the vicinity of Bacon's Bridge. The next day, the Union brigade moved to Summerville, and the commander stationed detachments at Ridgeville and Four Holes Swamp (*OR* Series 1, Vol. 47, Part 1:168). Later that month, the Union army ordered the 107th Ohio Volunteers to occupy Summerville, and its commander send units to guard the railroad from Charleston to Four Holes Creek. At the same time, Union General Hartwell's brigade was ordered to Orangeburg to guard the railroad from that point to Four Holes Creek (*OR* Series 1, Vol. 47, Part 3:484).

Reconstruction and the Postbellum Period. Profound changes for the area both economically and socially followed the end of hostilities in 1865. In the new state constitution adopted in 1866, St. George's Parish was abolished and the area became part of Colleton County. The antebellum economic system disintegrated as a result of emancipation and the physical destruction of agricultural property through neglect and (to a lesser extent) military action. Landowners and laborers found adjustments even more difficult due to a constricted money supply and huge debts. The changes were enormous. Land ownership was reshuffled as outsiders began purchasing former plantations abandoned in the wake of the Civil War. Newly freed slaves often exercised their freedom by moving, making the labor situation even more unsettled (Kovacik and Winberry 1987:106).

Forestry Products. Plantation owners throughout the Lowcountry had maintained forested areas on their lands, and used them for reserves for firewood and building materials. A locally-owned timber and turpentine industry rose in the late nineteenth century and then was taken over by outside investors, principally corporations, in the early twentieth century. After a century and

more of harvesting timber in the Lowcountry, the great stands of long-leaf yellow pines had been decimated by the late nineteenth century. The yield of timber from southern forests doubled between 1880 and 1890, and in the first three decades of the twentieth century the South's share of the nation's timber production rose from under one-third to nearly one-half (Simkins and Roland 1972:467). In 1895, however, the feed planing mill and the steam dry kiln were perfected. Demand for the giant stands of short leaf along the southern coast, loblolly pines that had long ago been written off rose sharply, and several big lumber mill operations emerged throughout the Lowcountry. In Charleston, for example, only phosphates played a larger role in Charleston's commercial life than timber in 1910 (Halsey 1938:209).

Phosphate Mining. The advent of phosphate mining in the 1870s benefitted many plantations in the northern part of Charleston and lower Dorchester (then Colleton) Counties as well as in Beaufort County. It was a short-lived industry, however, and did not produce any changes in the class structure or race relations that developed as a result of the plantation agricultural system in the region. Even though mining created a large demand for wage laborers, the many African Americans who were hired were under the control of white bosses. Also, the company provided housing, medical services, and general stores to the miners, with payment extracted from each workers' wages. Since the usual wage was between $3.50 and $7.50 per month, most miners were always in debt to the company (Shick and Doyle 1985:13).

Tenant Farming and Sharecropping. One result of this migration was a variety of labor systems. Reconstruction was a period of experimentation and redefinition in the socioeconomic relationships between the freed blacks, landless whites, and white landowners. Although many new freedmen owned their own small farms, farm tenancy emerged as a dominant form of agricultural land management toward the end of the nineteenth century. Instead of nucleated plantation systems, a more dispersed settlement pattern developed as tenant farming and small-farm ownership became prevalent. The economy of the counties remained agricultural, with both tobacco and cotton the dominant products. By 1900, 77 percent of South Carolina's tenant farmers were African American (Burton et al. 2006:952).

Farm tenancy emerged as a dominant form of agricultural land management toward the end of the nineteenth century. Tenancy had two basic forms, sharecropping and cash renting (Brockington et al. 1985; Orser and Holland 1984; Trinkley 1983a). Sharecropping was a system whereby the landowner provided all that the renter needed to tend and cultivate the land (i.e., draft animals, farming implements and tools, seed, and fertilizer). A variety of methods of payment by the renter could be arranged. However, usually an agreed portion of the crop (i.e., a share), would be surrendered to the landowner. Sharecropping was appropriate when tenants could not afford the capital outlay necessary to purchase seed, animals, and tools. Cash renting, on the other hand, generally represented an arrangement in which an agreed sum of money was paid to the landowner by the tenant farmer. In these instances, the farmer was more independent and farther removed from the landowner, and would provide his own animals, feed, seed, and equipment. This system generally allowed small farmers to accrue larger sums of money and, according to Brockington et al. (1985), was the preferred arrangement for tenant farmers, as it was regarded as a profitable operation that would help the tenants acquire their own property. Cash renting was desirable to the landlord because it removed him from the uncertainties of

market prices; removed the capital burden of supplying seed, fertilizer, and equipment; and assured steady cash income.

The Tenant-Farming Landscape. The landscape created by the tenant/sharecropper economic model contained several elements: tenant houses, farm fields, ancillary buildings and structures, and the geographical layout of the landscape. In the tenant/sharecropper model, the dispersed tenant cabins acted more as individual farms, and hence each supported and possessed the ancillary structures needed for agriculture, including barns and storage sheds. The ancillary buildings are discussed below. The tenant/sharecropper settlement plan was also more diversified and was more likely to support subsistence-crop production and leave lands idle (Messick et al. 2001:30).

In early tenant/sharecropping, tenant houses were either converted slave cabins or small, unpretentious cabins grouped away from the main house (Messick et al. 2001:88; Vlach 1993:153). Like most rural Southern vernacular housing, these houses were log or wood-frame structures covered with weatherboard or shiplap. The most basic slave quarter or tenant house was a one-bay house with a small porch. After the Civil War, tenant houses appeared that had a saddlebag configuration, with a chimney and fireplace located between the two rooms; this represented another common architectural style in the South. Each of the rooms had its own front door, enabling the planter to house two slave families in one dwelling (Messick et al. 2001:88). By 1900 most of the log buildings had nearly totally disappeared, and most tenants lived in frame buildings.

Because of the less-direct control owners exerted over tenants compared to slaves, tenant houses gradually changed over the years. As residents prospered, they individualized the houses as a means to express their economic independence. For example, many residents added modern conveniences, additional rooms and porches, or new exterior siding to their tenant houses (Messick et al. 2001:89).

Reflecting the changes in the labor system, tenant/sharecropper plantations subdivided large fields into smaller fields. Unlike the previous system, which dedicated large fields to cash crops, tenants might plant two or three crops in the small fields, with at least one being a cash crop. To ease the work, the tenant house was located near the field, not in a centralized location as slave cabins were (Hilliard 1990:123). These new divided fields sometimes had fences, hedges, tree lines, or other dividers, but in some instances there were no physical indicators of the division. Pathways to ancillary buildings, major roads, the main house, etc., also developed in the fields. Many of the fields also contained small garden patches and possibly a field for a cow or other livestock to support the family (Hudson 2002:178).

Because they were, in essence, small farmsteads, tenant/sharecropper farms possessed several ancillary buildings and structures, depending on the needs and size of the farm. These could include tobacco barns, livestock barns, chicken coops, etc. The location of these buildings at the farm site and not centralized near the main house further illustrates the changes in the agricultural landscape brought about by tenant farming. During the recent architectural survey of the I-73 Northern Corridor (Bailey et al. 2008), several tenant houses were identified; however, most did not still possess their ancillary buildings.

The development of tenant farming radically altered the agricultural landscape of the state. Unlike the centralized nature of antebellum plantations, tenant/sharecropper farming resulted in a dispersed settlement pattern. Tenant houses were located near the fields, not the main house. Tenants were allowed to develop other institutions such as churches that also appeared in the new landscape. Trees and other vegetation began to separate the subdivided fields, creating the illusion of separate farms. However, as Hilliard (1990:123) notes, the landowner still exercised control over the lives and economic success of the tenants. Because of the importance of the geographical layout of the tenant-farming landscape, the location of house sites is a very important piece of data. Using historic maps and the current location of tenant houses, we can identify patterns in the landscape that would not be apparent by merely studying individual sites.

The Twentieth Century and the Rise of the Sunbelt. Corn, cotton, phosphate mining, and truck farming were important elements of the postbellum economy in the late nineteenth century. Additionally, the legislature changed the political landscape in those years. In 1897, the state legislature combined old St. George's Parish and part of St. Paul's Parish from Colleton County with portions of Berkeley and Charleston Counties to create Dorchester County (Stauffer 1993:17). This political change had little to do with land uses, which otherwise were closely related to the surrounding counties. The project area continued to be rural, with the major products being sweet potatoes, corn, other vegetables, and timber. Gradually, timbering became the primary land use, especially after the 1920s. Much of old St. George's Parish was acquired by timbering companies in the 1920s and later by West Virginia Paper Company in the late 1920s and 1940s. The growth of the kraft paper business in the United States led companies such as West Virginia Paper Company in North Charleston and Union Bag Company in Savannah to acquire hundreds of thousands of acres in the Coastal Plain of South Carolina in the years before and after World War II. By 1980, some 65 to 75 percent of Dorchester County was owned or leased by paper companies (Kovacik and Winberry 1989:189).

Santee Cooper provides many of the public utilities for the project area. Santee Cooper has its origins during the Great Depression, when President Franklin Delano Roosevelt's New Deal sought to provide economic relief for South Carolina's unemployed and electric power to its rural towns and municipalities. T. Robert Hart (2006:839) summarizes the creation of Santee Cooper:

> In 1934 Governor Ibra Blackwood signed a bill creating the South Carolina Public Service Authority (Santee Cooper) and granting it permission to dam the Santee River, divert its water into the Cooper River, clear land for two large reservoirs, construct a hydroelectric plant at Pinopolis, and sell electricity to residents in surrounding counties. After a four-year court battle, construction began in 1939.

At the time, the Santee Cooper project was the largest, most expensive project in the state's history, providing relief to the depression-ravaged populace. Laborers cleared more than 160,000 acres in the Santee River floodplain and adjacent swamps. In the 1970s, Santee Cooper constructed another power plant at Cross, a site located between Lakes Marion and Moultrie.

World War II profoundly impacted the entire Charleston area, as it did much of the South. The war created an economic boom throughout the nation, made more dramatic in the South given the number of military bases located there. Charleston was a perfect example. The Navy Yard received new destroyers, shipbuilding plants, and other support facilities, while other military activities emerged in the city's suburbs. Summerville, in lower Dorchester County, became a bedroom community for the growth of nearby Charleston, as US Highway 78 and SC Route 61 linked the towns with paved roads.

2.2.4 Previous Cultural Resources Investigations Near the Summerville-Pepperhill 230 kV Transmission Line Project

We examined the state archaeological site files at SCIAA and the NRHP listings on Archsite for previously recorded archaeological sites, historic properties, and previous investigations within 0.5 mile of the proposed Summerville-Pepperhill 230 kV Transmission Line Project. Several cultural resource investigations have occurred within 0.5-mile of the project. Previous investigations identified several archaeological sites and architectural resources within 0.5-mile of the project (see Figure 1.1). Previous cultural resource investigations are summarized below. Table 2.1 summarizes the previously identified archaeological sites within 0.5-mile of the project. Table 2.2 summarizes the previously identified historic architectural resources within 0.5-mile of the project.

Table 2.1 Previously Identified Archaeological Sites Within 0.5-Mile of the Project.

Site	Site Type	NRHP Status
38CH230	19-20th century house and grave	Listed - (Destroyed)
38CH662	Early Woodland; unknown Post-Contact scatter	Potentially Eligible
38CH663	Late Archaic; 19th-20th century scatter	Potentially Eligible
38CH664	Woodland; 19th century scatter	Potentially Eligible
38CH665	19th century scatter	Potentially Eligible
38CH666	19th century scatter/possible homesite	Potentially Eligible
38CH667	19th century scatter	Potentially Eligible
38CH668	19th century scatter	Potentially Eligible
38CH673	18th-19th century scatter	Potentially Eligible
38CH1014	18th-19th century homesite	Potentially Eligible
38CH1015	Middle-Late Woodland scatter	Probably Not Eligible
38CH1016	Early-Middle Woodland ceramic scatter	Probably Not Eligible
38CH1674	18th-20th century Woodstock Plantation main house and cemetery	Eligible/Contributes to Eligible District
38CH1675	19th-20th century Woodstock railroad station	Eligible/Contributes to Eligible District
38CH2054	Unknown Pre-Contact; 17th-19th century Woodstock Plantation slave settlement	Eligible/Contributes to Eligible District
38CH2055	Unknown Pre-Contact and Post-Contact scatter	Not Eligible
38CH2056	Unknown Pre-Contact; 20th century scatter	Not Eligible
38CH2057	Unknown Pre-Contact; 19th century scatter	Not Eligible
38CH2058	Unknown Post-Contact scatter	Not Eligible
38CH2059	Unknown Pre-Contact scatter	Not Eligible
38CH2060	19th-20th century scatter/homesite	Not Eligible
38CH2061	19th-20th century scatter	Not Eligible
38CH2062	unknown Pre-Contact; 19th-20th century scatter	Not Eligible
38CH2063	Unknown Pre-Contact scatter	Not Eligible
38CH2068	17th-19th century inland rice field system	Contributes to Eligible District
38CH2075	Unknown scatter	Not Eligible
38CH2159	18th-19th century inland rice field system	Eligible

Table 2.2 Previously Identified Historic Architectural Resources Within 0.5-Mile of the Project.

Resource	Name	Date	NRHP Status
346 0010	Unnamed House	c. 1900	Not Eligible
496 0719	Mt. Zion Baptist Cemetery	1900	Not Eligible
276 0007	Goose Creek Huguenot Church Marker	1910	Not Eligible
	Woodstock Cemetery	c. 1763-1821	Eligible

Windsor Hill–Site 38CH230. Site 38CH230, located at Windsor Hill, was the site of General William Moultrie's grave. The site also contained the ruins of the main house at Windsor Hill Plantation; the house burned in 1850. The site was nominated for listing on the NRHP (Novick 1978) and was considered by the National Register Review Board in 1979; however, it was deferred (due to owner objection), so the site was never actually listed on the NRHP. According to family tradition, General Moultrie was buried in the family burial ground. Smith (1988) notes that a study by Reverend William A. Guerry culminating in an article in the February 21, 1909 *News and Courier* concluded that the general was buried at his son's plantation, Windsor Hill. Due to developmental pressures in the 1970s, all the burials were moved (South 1979a, 1979b). General Moultrie was reburied at Fort Moultrie on Sullivans Island, and the rest were reinterred at St. James Parish Church near Goose Creek (Heitzler 2006:191-196). Prior to the development/razing of the site area, Powell and South (1986) conducted emergency salvage archaeological investigations at Site 38CH230. Because of the removal of General Moultrie's and all others remains, as well as the razing of all traces of site 38CH230, it was determined that Windsor Hill/Site 38CH230 does not meet National Register Standards to be listed on the NRHP. No evidence of 38CH230 was encountered during the current survey investigations (see Chapter 3).

Archaeological Survey of the SC 31 Borrow Pit. Trinkley (1983b–1983k) recorded nine sites (38CH662–38CH669 and 38CH673) during a borrow pit survey that are within 0.5-mile of the current project. Trinkley (1983b–1983i) only cursorily inspected each of the sites and recommended all of the sites potentially (possibly) eligible for the NRHP. Site 38CH662 is a scatter of Early Woodland and Post-Contact artifacts (Trinkley 1983b). In Trinkley's (1983f) site form for nearby Site 38CH666, he noted that the predominantly Post-Contact site "…may be the source of the sparse historic material found at 38CH662, located about 300 ft to the northwest." Site 38CH663 consists of a scatter of Woodland and eighteenth- to nineteenth-century artifacts (Trinkley 1983c). Site 38CH664 consists of a scatter of unknown Pre-Contact and nineteenth-century artifacts (Trinkley 1983d). Site 38CH665 consists of a scatter of nineteenth-century artifacts (Trinkley 1983e). Site 38CH666 consists of a surface scatter of nineteenth-century artifacts (Trinkley 1983f). Site 38CH667 consists of a scatter of unknown Pre-Contact and nineteenth-century artifacts (Trinkley 1983g). Site 38CH668 consists of a scatter of nineteenth-century artifacts (Trinkley 1983h). Site 38CH673 consists of a scatter of eighteenth- and nineteenth-century artifacts (Trinkley 1983i).

Archaeological Survey of Two Borrow Pits in Charleston County. Tippett (1988a–1988c) recorded three archaeological sites (38CH1014–38CH1016) during a borrow pit survey. Site 38CH1014 is the remnants of a late seventeenth- to eighteenth-century homesite; the site is potentially eligible for the NRHP (Tippett 1988a). During the current investigations,

investigators revisited the reported location of Site 38CH1014. The entire area has been disturbed/destroyed by grading and the deposition of fill materials in the form of concrete, gravel, sand, and clay. These disturbances appear to be associated with the active landfill just north of the reported location of the site. No evidence remains of Site 38CH1014 within the current project corridor (see Chapter 3). Site 38CH1015 consisted of a scatter of Middle to Late Woodland ceramic artifacts. Tippett (1988b) recommended the site probably not eligible for the NRHP and noted that the site would likely be destroyed by the excavation of the borrow pit. Site 38CH1016 consists of two Middle Woodland sherds. Tippett (1988c) recommended the site probably not eligible for the NRHP.

Berkeley County Historical and Architectural Inventory. During Schneider and Fick's (1989) aboveground study of Berkeley County, researchers identified two historic architectural resources within 0.5-mile of the current project. Resource 346 0010 is an unnamed house constructed circa 1900; the resource is not eligible for the NRHP. Resource 276 0007 is the Goose Creek Huguenot Church Marker, erected in 1910; the resource is not eligible for the NRHP.

Charleston County Historical and Architectural Survey. During Fick's (1992) above ground study of Charleston County, researchers identified one historic architectural resource within 0.5-mile of the current project. Resource 496 0719, the Mt. Zion Baptist Cemetery, dates to 1900. The resource is not eligible for the NRHP.

Archaeological Survey of US 78 Improvements Project. In 1993, the SCDOT conducted an archaeological survey of the US 78 Improvements Project (Shumate 1993). Investigators identified no cultural resources within 0.5-mile of the current project.

Archaeological and Architectural Survey of the I-26 Widening Improvements. In March 1994, Brockington and Associates, Inc. conducted an archaeological and architectural survey for the 13.2-mile-long proposed I-26 widening project. The project consisted of widening and construction of six new interchange areas. Butler (1995) identified no cultural resources within 0.5-mile of the current project.

Archaeological Survey of US 78/S-169/S-535 and S-76/S-1120 Intersections. In 1996, the SCDOT conducted archaeological surveys of the US 78/S-169/S-535 and S-76/S-1120 intersections (Ramsey-Styer 1996). Investigators recorded no cultural resources during these surveys.

Cultural Resources Reconnaissance of the Ingleside Plantation Tract. In 1997, Brockington and Associates, Inc. conducted a cultural resources reconnaissance of the Ingleside Plantation Tract. Bailey (1997) identified two sites during this investigation that are within 0.5-mile of the current project. Site 38CH1674 is the remnants of the main house and a cemetery associated with Woodstock Plantation. Site 38CH1675 is the remnants of a train depot. Bailey (1997) recommended both sites potentially eligible for the NRHP. The owners of the Ingleside Plantation Tract used the reconnaissance to help plan the development of the tract to minimize potential impacts on significant cultural resources.

Cultural Resources Survey of the Fabian Tract. In November 1997, Brockington and Associates, Inc. conducted a cultural resources survey of the Fabian Tract. McMakin and Bailey (2002) identified no cultural resources within 0.5-mile of the current project.

Cultural Resources Survey of the Victoria Facility Tract 3 at Palmetto Commerce Park. Bailey and Wolf (1998) conducted the cultural resources survey of the Victoria Facility Tract 3 at Palmetto Commerce Park. Investigators identified no cultural resources during this survey.

Archaeological and Architectural Survey of the Ladson Road Widening from US 78 to Eagle Circle. In 1998, the SCDOT conducted a cultural resources survey prior to the widening of Ladson Road between US 78 and Eagle Circle (Marcil 1998**)**. Investigators identified no cultural resources within 0.5-mile of the current project.

Addendum to Archaeological and Architectural Investigations of the Ladson Road Widening from US 78 to Eagle Circle. In 1998, the SCDOT conducted additional cultural resource investigations for the Ladson Road Widening from US 78 to Eagle Circle project (SCDOT 1998). Investigators identified no cultural resources during this survey.

Cultural Resources Survey of the CPW at I-26 and US Route 78. In 2004, Brockington and Associates conducted a cultural resources survey of the CPW at I-26 and US Route 78 (Shuler and Munson 2004). Investigators identified no cultural resources within 0.5-mile of the current project.

Cultural Resources Survey of the Palmetto Commerce Park Tract. Bailey and Chambliss (2005) conducted the cultural resources survey of the Palmetto Commerce Park Tract. Investigators identified no cultural resources within 0.5-mile of the current project.

Intensive Cultural Resources Assessment Survey of the Colony North Parcel. Bland (2006) conducted a cultural resources assessment of the Colony North Parcel. He noted no previously recorded resources within 0.5-mile of the current project area.

Cultural Resources Survey and Testing of the Weber Research Tract. Bailey et al. (2006) conducted a cultural resources survey of the Weber Research Tract, as well as testing of several sites identified during the survey. The cultural resources survey resulted in the identification of 12 sites (38CH2054–38CH2063, 38CH2068, and 38CH2075) and a revisit of two previously recorded sites (38CH1674 and 38CH1675) within 0.5-mile of the current project. Evaluative testing was conducted at Sites 38CH1674, 38CH1675, and 38CH2054. Site 38CH1674 consists of the eighteenth- to nineteenth-century Woodstock Plantation main house remnants and the Woodstock Cemetery (the Bee and Bulline families' cemetery). This site is eligible for the NRHP and contributes to the Woodstock Plantation Historic District. Site 38CH1675 includes two eighteenth-century inland rice retention ponds, the Woodstock rail station, and the Woodstock Hardwood and Spool Manufacturing factory. This site is eligible for the NRHP and contributes to the Woodstock Plantation Historic District. Site 38CH1676 consists of the eighteenth- to nineteenth-century Ingleside Plantation. This site is potentially eligible for the NRHP. Site 38CH2054 consists of an eighteenth- to nineteenth-century slave village. The site is eligible for the NRHP and contributes to the Woodstock Plantation Historic District. Site

38CH2055 consists of an unknown Pre-Contact scatter and a scatter of nineteenth-century artifacts; the site is not eligible for the NRHP. Site 38CH2056 consists of an unknown Pre-Contact scatter and a scatter of twentieth-century artifacts; the site is not eligible for the NRHP. Site 38CH2057 consists of an unknown Pre-Contact scatter, as well as a scatter of nineteenth-century artifacts; the site is not eligible for the NRHP. Site 38CH2058 consists of an unknown Post-Contact scatter; the site is not eligible for the NRHP. Site 38CH2059 consists of an unknown Post-Contact scatter; the site is not eligible for the NRHP. Site 38CH2060 is a late nineteenth- to early twentieth-century house site; the site is not eligible for the NRHP. Sites 38CH2061 and 38CH2062 both consist of an unknown Pre-Contact scatter and a nineteenth- to twentieth-century scatter; both sites are not eligible for the NRHP. Site 38CH2063 is a scatter of unknown Pre-Contact artifacts; the site is not eligible for the NRHP. Site 38CH2068 consists of numerous landscape features including dikes, canals, and ditches in Bluehouse Swamp, all associated with inland rice cultivation in the early eighteenth and nineteenth centuries. The site is not eligible for the NRHP individually; however, Bailey et al. (2006) recommended that the site is a contributing element of the proposed Woodstock Plantation Historic District. Site 38CH2075 consists of a scatter of unknown Pre- and Post-Contact artifacts; the site is not eligible for the NRHP.

Bailey et al. (2006) identified four sites (38CH1674, 38CH1675, 38CH2054, and 38CH2068) associated with the history of Woodstock Plantation. The NRHP-eligible Woodstock Plantation Historic District has strong historical associations with significant themes related to the development of South Carolina and the United States. The proposed district incorporates resources associated with the development of a plantation based on slave labor supported by the cultivation of inland rice fields in the early eighteenth century through the early nineteenth century. The development of the South Carolina Railroad in the 1830s, with one of the four original stops in Charleston County at Woodstock, transformed the plantation into an inn for travelers from the railroad. Unfortunately, the plantation was located at the epicenter of the 1886 earthquake, which caused the destruction and abandonment of the main plantation house. Finally, the plantation saw the development of the Woodstock Hardwood and Spool Manufacturing factory along the railroad line. This company operated until the early twentieth century and the abandonment of the Woodstock rail stop. The Woodstock Plantation Historic District is composed of four archaeological sites (38CH1674, 38CH1675, 38CH2054, and 38CH2068). The Summerville-Pepperhill 230 kV Transmission Line Project, located on existing alignment, does not pass through any of these sites. Therefore, the proposed Summerville-Pepperhill 230 kV Transmission Line Project will have no adverse effect on the Woodstock Plantation Historic District.

Cultural Resources Reconnaissance of the Treeland and Bland Farm Residential Development. In 2007 S&ME, Inc. conducted a cultural resources reconnaissance of the Treeland and Bland Farm Residential Development (Morgan 2007). Investigators identified no cultural resources within 0.5-mile of the current project.

Cultural Resources Survey of the Palmetto Commerce Parkway Extension Project. Fletcher et al. (2008) conducted the cultural resources survey of the Palmetto Commerce Parkway Extension Project. Within 0.5-mile of the current project, investigators identified one archaeological site (38CH2159), revisited one previously identified site (38CH662), and

revisited the reported location of Site 38CH666, but found no evidence of that site. Site 38CH2159 is an extensive inland rice dike system located near the east end of McChune Branch. Site 38CH2159 is eligible for the NRHP. Fletcher et al. (2008) mapped the extent of 38CH2159 up to the eastern edge of the transmission line corridor that the current project is/involves. The current investigations for the Summerville-Pepperhill 230 kV Transmission Line resulted in the slight extension of the western mapped limits of 38CH2159 (see Chapter 3).

3.0 Results and Recommendations

Brockington and Associates, Inc. designed the intensive cultural resources survey of the proposed Summerville-Pepperhill 230 kV Transmission Line to identify and assess all cultural resources in the project corridor. The Summerville-Pepperhill 230 kV Transmission Line is an existing transmission line corridor. No new ROW is required for the transmission line corridor and the 230 kV transmission line is being rebuilt in situ. As they enter each SCE&G-owned substation property parcel, the new and existing 230 kV circuits may be separated and aligned slightly differently, but no new ROW will be required. There are no survey-eligible structures within the project corridor. During the current investigations, we revisited three previously recorded archaeological sites (38CH230, 38CH1014, and 38CH2159) within the project corridor.

Site 38CH230, located at Windsor Hill, was the site of General William Moultrie's grave. The site also contained the ruins of the main house at Windsor Hill Plantation; the house burned in 1850. The site was nominated for listing on the NRHP by Novick (1978) and was considered by the National Register Review Board in 1979; however, it was deferred (due to owner objection), so the site was never actually listed on the NRHP. Due to developmental pressures in the 1970s, all of the burials were moved (South 1979a, 1979b). General Moultrie was reburied at Fort Moultrie on Sullivans Island, and the rest were reinterred at St. James Parish Church near Goose Creek (Heitzler 2006:191-196). Prior to the development/razing of the site area, Powell and South (1986) conducted emergency salvage archaeological investigations at Site 38CH230. Because of the removal of General Moultrie's and all others remains, as well as the razing of all traces of Site 38CH230, it was determined that Windsor Hill/Site 38CH230 does not meet National Register Standards to be listed on the NRHP. No evidence of 38CH230 was encountered during the current survey investigations.

Investigators revisited the reported location of previously identified NRHP potentially eligible Site 38CH1014 (Tippett 1988a) and found that the entire area has been disturbed/destroyed by grading and the deposition of fill materials; these activities appear to be associated with the active landfill just north of the reported location of the site. Investigators excavated shovel tests at 50-ft intervals through the reported location of the site but found only evidence of the modern fill and dumping. No evidence remains of Site 38CH1014 within the current project corridor.

Archaeological investigations during the current investigations resulted in the revisit and slight expansion of one archaeological site (38CH2159). Site 38CH2159 is discussed below.

3.1 Site 38CH2159 (revisit)

Cultural Affiliation *– Eighteenth and nineteenth century*
Site Type *– Inland rice field embankment/canal system*
Site Dimensions *– 2,500 feet N/S by 4,500 feet E/W*
Soil Type *– Wagram loamy fine sand, Wadmalaw fine sandy loam, Yonges loamy fine sand, Santee loam, Hockley loamy fine sand*
Elevation *– Five feet amsl*
Nearest Water Sources *– McChune Branch and Bluehouse Swamp*
Present Vegetation *– Cypress swamp/mixed pines and hardwoods*
NRHP/Management Recommendations *– Eligible / preserve in place or mitigate*

Site 38CH2159, an extensive inland rice dike system located near the east end of McChune Branch (see Figure 1.1), was identified by Fletcher et al. (2008) during the cultural resources survey of the Palmetto Commerce Parkway Extension Project. Fletcher et al. (2008) mapped the extent of 38CH2159 up to the eastern edge of the transmission line corridor that is the corridor that makes up the current Summerville-Pepperhill 230 kV Transmission Line project. The current investigations resulted in the slight extension of the western mapped limits of 38CH2159 within the transmission line corridor, as well as a newly recorded portion of the site to the northwest of the Pepperhill substation. The vegetation of the expanded site area in the transmission line corridor is generally tall grass and weeds. The newly recorded portion of 38CH2159 to the northwest of the Pepperhill substation is located within an area wooded in mature pines and hardwoods. Figure 3.1 presents Fletcher et al.'s (2008:48) plan of Site 38CH2159, showing the extended site boundaries defined during the current investigations.

Fletcher et al. (2008) noted that the banks of Site 38CH2159 are generally extremely well preserved and are prime examples of eighteenth-century inland rice field elements. A causeway road runs nearly due south from the high ground on the north side of the field system, and this road is lined with canals on either side. This causeway splits the field system in half, with the west side associated with Windsor Hill and the east side associated with Thomas Parker's plantation. Fletcher et al. (2008) did not follow all of the banks to their termination because this drainage system (McChune Branch to the west and Bluehouse Swamp to the north) has inland fields throughout its extensive swampland. The rice field features Fletcher et al. (2008) defined were bounded by two transmission line corridors that have been largely filled and/or drained, thus disrupting the rice field system. Fletcher et al. (2008) noted that the rice field features likely extended beyond the transmission line corridors, but for the purposes of their project, they terminated their recordation of the rice field features at the transmission line corridors, with the exception of a small upland bank approximately 1,200 ft east/southeast of the eastern edge of the core sections of Site 38CH2159. The current investigations of the Summerville-Pepperhill 230 kV Transmission Line project are along the western transmission line of the two mentioned by Fletcher et al. (2008) (see Figure 3.1).

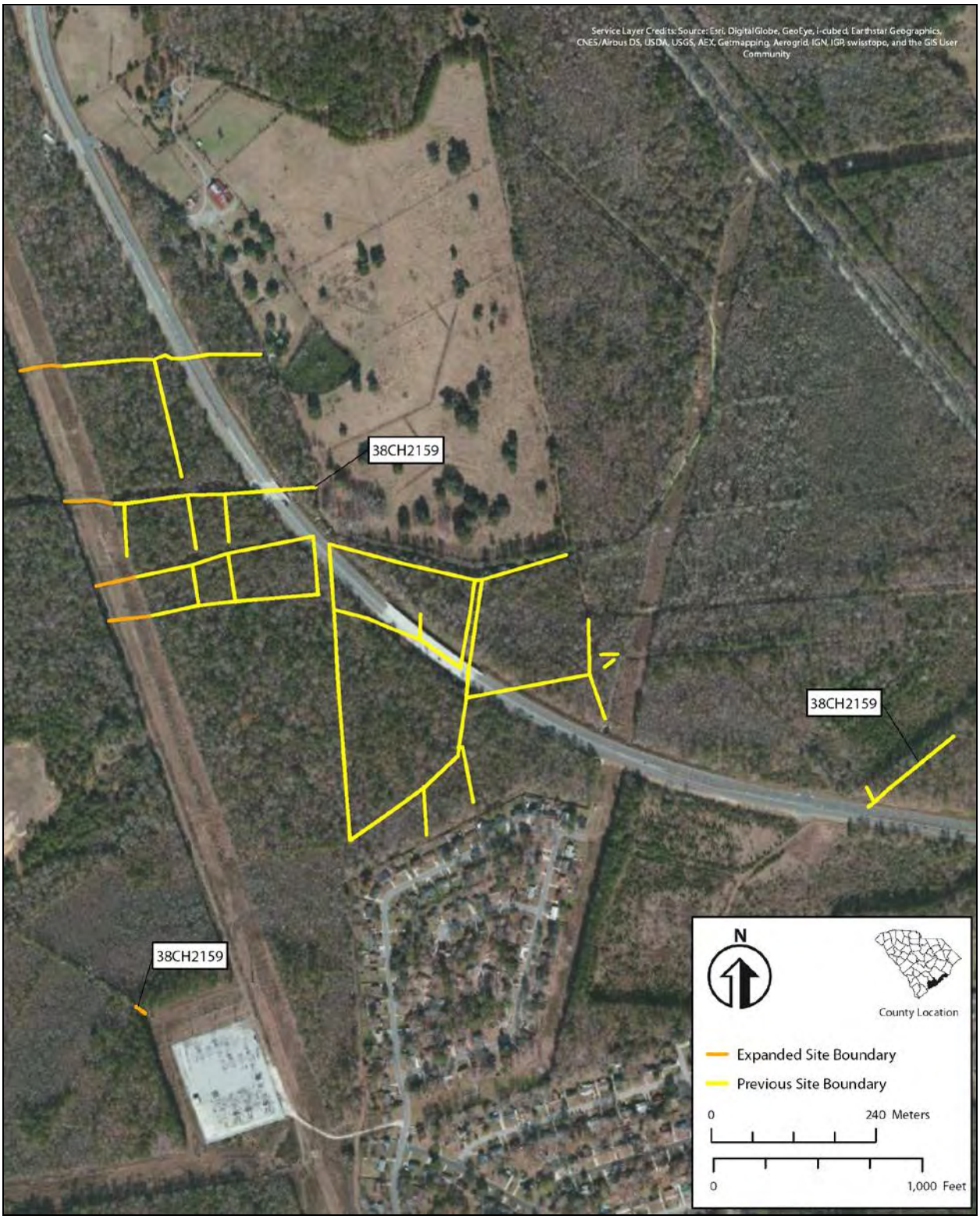


Figure 3.1 Plan of Site 38CH2159 (from Fletcher et al. 2008:48).

During the current investigations, investigators noted the presence of/portions of two embankments that extend slightly into the transmission line corridor and four ditches (one of which is McChune Branch) associated with former embankments that extend across the transmission line corridor (see Figure 3.1). Figure 3.2 presents a view of an embankment to the south of McChune Branch, which was a primary water source for the formation and operation of the rice fields. These embankments and ditches visibly extend into the wooded area to the west of the corridor, but we did not delineate these, as they are located on privately-owned land outside of our project area. Generally, the remaining portions of the embankments still present within the transmission line corridor rise only approximately one ft above the surrounding ground surface, considerably less than the previously mapped portions located in wooded areas to the east of the corridor, but they are present, nonetheless. It is likely that the clearing, construction, and maintenance of the transmission line corridor have resulted in the truncation of the embankments. However, their layout and association with more intact portions of the inland rice field system of 38CH2159 is significant.

Figure 3.2 View of rice embankment and McChune Branch within the transmission line corridor, facing west.

Investigators also recorded an isolated portion of 38CH2159 in a wooded area to the northwest of the Pepperhill substation. This portion of the site consists of an embankment flanked by ditches on either side. The embankment and ditches run northwest to southeast, up to the northwest corner of the clearing around the Pepperhill substation (see Figure 3.1). The embankment measures approximately 20 ft wide from ditch to ditch, and is approximately three to four ft tall within our 50-ft wide study area within the woods. Each ditch, currently filled with water, measures approximately six ft wide within our study area. Young to mature pines and hardwoods grow atop the embankment. The embankment and ditches appear to be remarkably

intact portions of Site 38CH2159. Figure 3.3 presents a view of the portion of 38CH2159 to the northwest of the Pepperhill substation.

Figure 3.3 View of rice embankment and ditches to the northwest of the Pepperhill substation, facing northwest.

Fletcher et al. (2008) evaluated Site 38CH2159 for NRHP eligibility based on its significance under the four criteria for evaluation (A, B, C, and D [Townsend et al. 1993:16-23]). Site 38CH2159 was found to be eligible under Criteria A, C, and D. The two embankment segments and four ditches that are part of 38CH2159 and extend into the transmission line corridor are currently spanned by single-circuit H-frame structures over a distance of approximately 2,500 ft north/south. Any new single-pole double-circuit towers, which will be spaced typically 400 to 700 ft apart, should be placed similarly, so as not to adversely affect elements that make up NRHP-eligible Site 38CH2159. The newly recorded portion of 38CH2159 to the northwest of the Pepperhill substation is located within a relatively undisturbed wooded area. If trees are to be removed from the approximately 50-ft-wide strip along the southern edge of the wooded area, caution should be exercised in the area of and adjacent to the embankment and ditches associated with Site 38CH2159. Trees and vegetation in this area should be carefully removed by hand (i.e., no heavy machinery on the embankment and ditches) to avoid an adverse effect to Site 38CH2159. If these embankments/ditches cannot be avoided, then all proposed mitigation of adverse effects to Site 38CH2159 will be developed in consultation with SCDAH.

3.2 Project Summary and Management Recommendations

Brockington and Associates, Inc. conducted a cultural resources survey of the proposed 7.8-mile long Summerville-Pepperhill 230 kV Transmission Line in Berkeley and Charleston Counties, South Carolina from May 27-30 and July 18, 2014. A cultural resources literature review and architectural windshield reconnaissance was completed by Brockington and Associates, Inc. (Wagoner 2012) in 2012 during the planning stages of the project and the data was provided to the client. For the current project, no new ROW is required and the 230 kV transmission line is being rebuilt in situ. There are no survey-eligible structures within the project corridor. Investigators conducted an archaeological survey within the existing transmission line corridor and in expanded areas around the existing Summerville and Pepperhill substations.

During these investigations, we revisited three previously recorded archaeological sites (38CH230, 38CH1014, and 38CH2159) within the project corridor. Site 38CH230, located at Windsor Hill, was the site of General William Moultrie's grave. The site has been destroyed and all burials were removed in the 1970s. No evidence of 38CH230 was encountered during the current survey investigations. Investigators revisited the reported location of previously identified NRHP potentially eligible Site 38CH1014 (Tippett 1988a) and found that the entire area has been disturbed/destroyed by grading and the deposition of fill materials; these activities appear to be associated with the active landfill just north of the reported location of the site. No evidence remains of Site 38CH1014 within the current project corridor.

Site 38CH2159, an extensive inland rice dike system located near the east end of McChune Branch, was identified by Fletcher et al. (2008) during the cultural resources survey of the Palmetto Commerce Parkway Extension Project. Fletcher et al. (2008) mapped the extent of 38CH2159 up to the eastern edge of the transmission line corridor that makes up the current Summerville-Pepperhill 230 kV Transmission Line project. The current investigations for the Summerville-Pepperhill 230 kV Transmission Line resulted in the slight extension of the western mapped limits of 38CH2159 within the transmission line corridor, as well as a newly recorded portion of the site to the north of the Pepperhill substation. Site 38CH2159 remains eligible for the NRHP and the placement of new single-pole double-circuit towers within existing cleared areas should avoid/span ditches and embankments that are elements of the site. The newly recorded portion of 38CH2159 to the northwest of the Pepperhill substation is located within a relatively undisturbed wooded area. If trees are to be removed from the approximately 50-ft wide strip along the southern edge of the wooded area, caution should be exercised in the area of and adjacent to the embankment and ditches associated with Site 38CH2159. Trees and vegetation in this area should be carefully removed by hand (i.e., no heavy machinery on the embankment and ditches) to avoid an adverse effect to Site 38CH2159. Given that inland rice field elements of NRHP-eligible Site 38CH2159 are avoided/spanned, and wooded areas adjacent to and on the embankment and ditches to the northwest of the Pepperhill substation are cleared by hand, proposed land-disturbing activities in the Summerville-Pepperhill 230 kV Transmission Line project will not affect any historic properties and should be allowed to proceed without further management consideration. If these embankments/ditches cannot be avoided, then all proposed mitigation of adverse effects to Site 38CH2159 will be developed in consultation with SCDAH.

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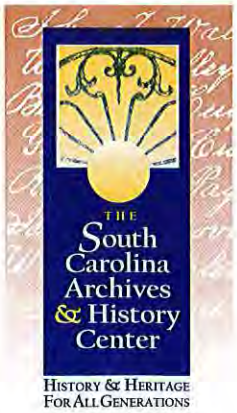
Appendix A

SHPO Correspondence



September 8, 2014

Josh Fletcher
Brockington & Associates
498 Wando Park Blvd.
Mt. Pleasant, SC 29464

Re: Summerville-Pepperhill 230kV Transmission Line, Draft CRS
Berkeley and Charleston Counties, South Carolina
SHPO No. 14-ED0110

Dear Josh Fletcher:

Thank you for your letter August 19, which we received on August 20, regarding the above-named project. We also received the draft report, *Cultural Resources Survey of the Summerville-Pepperhill 230 kV Transmission Line, Berkeley and Charleston Counties,* as supporting documentation for this undertaking. The State Historic Preservation Office is providing comments to the U.S. Army Corps of Engineers pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR 800. Consultation with the SHPO is not a substitution for consultation with Tribal Historic Preservation Offices, other Native American tribes, local governments, or the public.

The survey revisited three archaeological sites. Site 38CH230 was the site of General William Moultrie's grave, which was moved in 1970 and no evidence of the site was encountered. Site 38CH1014, an 18th-19th century homesite, was previously determined potentially eligible for inclusion in the National Register of Historic Places (NRHP) in 1988, but was found to be disturbed/destroyed during the current survey. Our office concurs that sites 38CH230 and 38CH1014 are no longer eligible for listing in the NRHP.

Site 38CH2159 is an inland rice dike system; boundaries were found to extend beyond the previously defined limits and include portions of the transmission line corridor and an area north of the Pepperhill substation. Our office concurs that 38CH2159 is eligible for inclusion in the NRHP. We also concur with the recommendation that the rice field should be avoided/spanned and any vegetation be carefully removed by hand to avoid an adverse effect. If this is not possible, further consultation with our office is necessary to develop a mitigation plan.

To complete the consultation process: please submit one (1) bound and one (1) unbound hard copies on acid-free paper and two (2) digital copies in PDF format. Investigators

should send all copies directly to SHPO. SHPO will distribute the appropriate copies to SCIAA.

If you have any questions, please contact me at (803) 896-6181 or at edale@scdah.state.sc.us.

Sincerely,

Emily Dale
Staff Archaeologist/GIS Coordinator
State Historic Preservation Office

cc. Keith Derting, SCIAA

Archaeological Survey for a Segment of the Williams - Pepperhill 230 kV Line, Charleston County, South Carolina

Addendum Report

By: Larry James

April 16, 2018

1.0 Introduction

In April 2018, Brockington and Associates, Inc. (Brockington), contracted with UC Synergetic, LLC (UCS) to conduct an archaeological survey for a segment of the Williams - Pepperhill 230 kV Line located at the Pepperhill Sub-station site in Charleston County, South Carolina. This addendum report augments work conducted by Brockington on the Pepperhill - Summerville 230 kV transmission line corridor for UCS in July 2014 (Fletcher 2014). Both Brockington projects were conducted for UCS on behalf of South Carolina Electric and Gas (SCE&G), in preparation for proposed upgrading of a new segment of the 230 kV transmission line. The goal of the archaeological survey was to determine whether any historic properties (i.e., sites, buildings, structures, objects, or districts listed on or eligible for the National Register of Historic Places [NRHP]) may be affected by this transmission line upgrade project.

SCE&G proposes to upgrade the existing Pepperhill - Summerville 230 kV terminal at the Pepperhill Substation. This upgrade will allow the existing Canadys - Williams 230 kV line to be terminated with the existing Pepperhill – Summerville 230 kV line. When terminated, this new line will become the Williams - Pepperhill 230 kV Line. To accomplish this task, the project requires building a new 230 kV line segment in SCE&G's existing right-of-way (ROW) adjacent to the eastside of the Pepperhill Sub-station. This portion of the Pepperhill Substation fell outside of the area surveyed by Fletcher in 2014. The additional project area measures approximately 1000 feet long and 100 feet wide, which is the Area of Potential Effect (APE). The APE falls within the existing 7.8-mile-long Pepperhill - Summerville 230 kV line ROW corridor. Figure 1 shows the location of the Williams - Pepperhill 230 kV tie line ROW and all previously recorded cultural resources within 0.50 mile of the project area on the United States Geological Survey (USGS 1979) *Ladson, SC* quadrangle. Figure 2 shows the location of the Williams - Pepperhill 230 kV Line ROW on recent aerial imagery.

2.0 Setting

The Pepperhill Sub-Station site is located approximately one mile north of Ashley Phosphate Road in the City of North Charleston, Charleston County, South Carolina. The APE is bound to the east by the Pepperhill residential neighborhood and to the south, west, and north by hardwood swamp wetlands. Portions of these swamps, particularly to the north and northeast, are associated with the former inland rice fields of the eighteenth through nineteenth century (see Archaeological Sites 38CH230 and 38CH2159). Today, these wetlands drain towards McChune Branch and Pepperdam Creek. The tributaries northwest and southwest of tract respectively into the Ashely River. The eastern wetlands flow northeast into the Bluehouse Swamp, a headwater of Goose Creek, and from Goose Creek into the Cooper River.

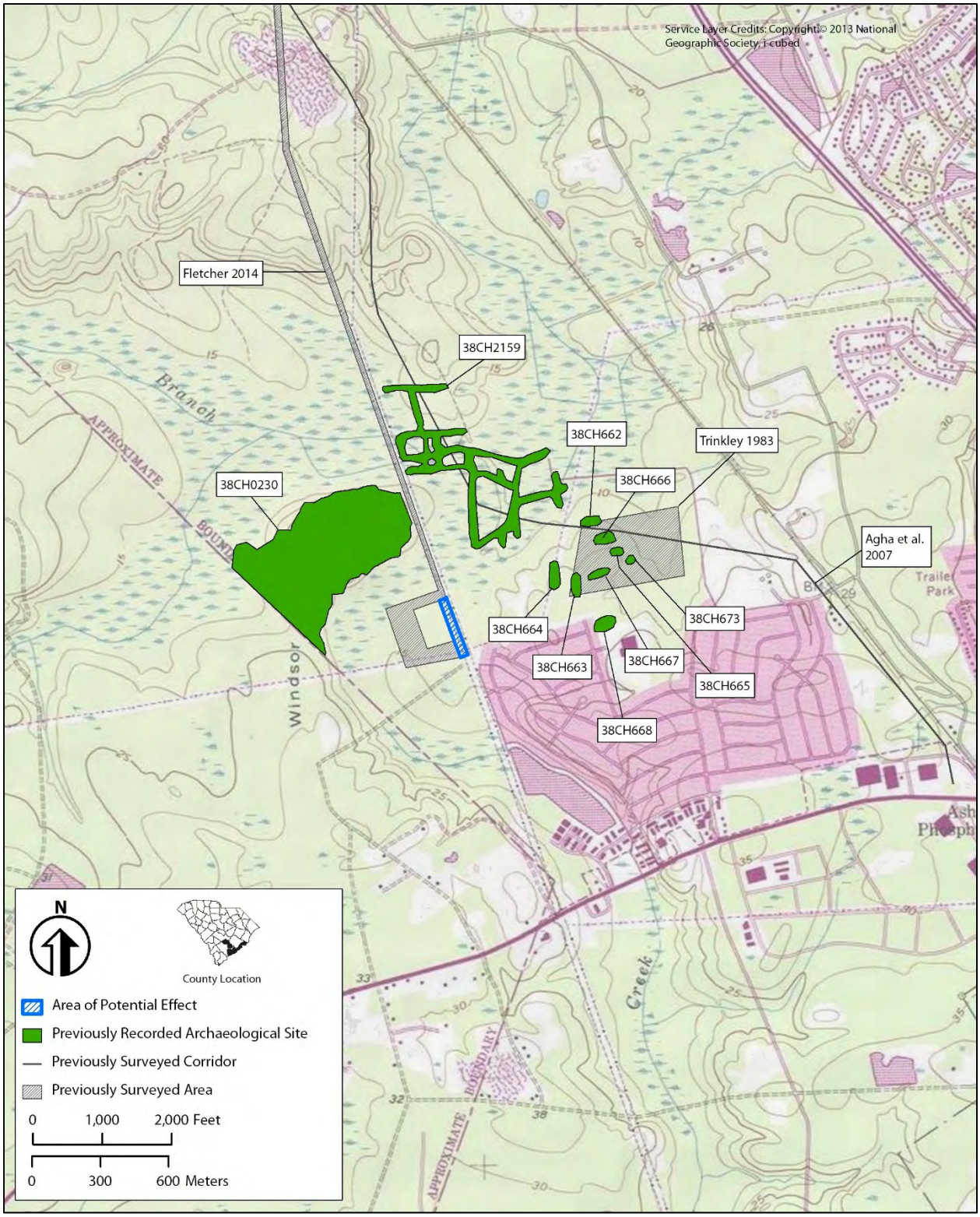


Figure 1. The location of the Williams - Pepperhill 230 kV tie line ROW and all previously recorded cultural resources within 0.5 miles of the project area on the United States Geological Survey (USGS 1979) Ladson, SC quadrangle.

Figure 2. The location of the Williams - Pepperhill 230 kV Line ROW on recent aerial imagery.

The Pepperhill Substation site is mostly within an undeveloped portion of land surrounded by the residential developments. The APE is situated within the existing SCE&G transmission line corridor which is partially maintained as grassy fields and low-lying wetlands. Soils in the project corridor consists of Wagram loamy fine sand (0 to 6 percent slopes). These soils are well drained and located on marine terraces (Miller 1971:30). However, much of this portion of the corridor is wet and the upland portion is occupied by the Pepperhill Substation. Outlying upland areas surrounding the APE and include pockets of undeveloped or pine and hardwood forest. Figures 3-4 provides views of the project setting.

Figure 3. View of the project setting, facing north.

Figure 4. View of the project setting, facing south.

3.0 Results and Recommendations

3.1 Introduction

Archaeological survey of the Williams - Pepperhill 230 kV Line conforms to the South Carolina Standards and Guidelines for Archaeological Investigations (COSCAPA et al. 2013). Tasks performed include background research and archaeological field investigations.

3.2 Background Research

Background research for the current project included a review of the findings of Fletcher (2014) and an examination of historic maps. Fletcher (2014) conducted background research within a 0.5-mile buffer encompassing the Pepperhill - Summerville 230 kV transmission line ROW, which includes the current ROW. Fletcher (2014:36) identified 27 archaeological sites and four architectural resources within 0.5-mile of the project (see Table 2.1 and 2.2 in Fletcher 2014:36-37).

Before conducting the archaeological field investigation, archaeologist Larry James reviewed a variety of historic maps, including the USGS (*Ladson, SC* 1979) topographic map.

Using the same 0.5-mile buffer for the current project, a total of ten resources are found near the project APE (38CH230, 38CH662-668, 38CH673, 38CH2159) (see Figure 1). Of these sites, two were determined eligible (38CH230 and 38CH2159) and eight were listed as potentially eligible (38CH662-668, 38CH673) for listing on the NRHP. This research was conducted on the ArchSite program (maintained by the South Carolina Department of Archives and History and South Carolina Institute of Archaeology and Anthropology). No new eligible or listed cultural resources have been recorded since 2014; however, sites 38CH2159, 38CH230, 38CH662-667, and 38CH673 have been recently revisited which resulted in some changes to their NRHP status.

Site 38CH2159 is an extensive inland rice dike system located near the east end of McChune Branch. Site 38CH2159 was identified in 2007 during the Palmetto Commerce Parkway corridor survey (Agha et al. 2007) and was determined eligible for the NRHP. Fletcher's (2014) Summerville-Pepperhill 230 kV Transmission Line survey resulted in the slight extension of the western mapped limits of 38CH2159. Site 38CH230 is located approximately 650 feet northeast of the current APE. No evidence of Site 38CH2159 was encountered during the current survey.

In September 2017, Brockington revisited Site 38CH230 (Windsor Hill Plantation) (James and Philips 2018). Our survey identified seven artifact concentrations (Loci 1-7). Six of these seven (Loci 1-5 and 7) are displaced scatters that do not contribute to the NRHP eligibility of 38CH230. Locus 6, the remnants of a slave dwelling associated with the former Windsor Hill Plantation and contributes to the NRHP eligibility of 38CH230. The current boundary of 38CH230 has been slightly altered and now reflects the 70 acres of undeveloped uplands which now encloses the former Windsor Hill Plantation. Site 38CH230 is located approximately 985-feet northwest of the current APE. No evidence of Site 38CH230 was encountered during the current survey.

In 2018, Brockington revisited archaeological sites 38CH663-667, and 38CH674 (Poplin 2018). These archaeological sites were identified during the SCDOT Archaeological Investigation of the Ashely Phosphate Road Woodlands Borrow Pit (Trinkley 1983). The technical report and SHPO determination is pending landowner permit application processing. However, according to Poplin (2018), Brockington will be recommending all these sites not eligible for the National Register of Historic Places (NRHP). Sites 38CH663-667 and 38CH674 display severe disruptions of deposits in many areas, likely related to the long-term use of the tract for commercial timber production and the activities associated with the preparation of a borrow pit in 1983.

3.3 Archaeological Survey

Archaeological field investigations were conducted on April 11, 2018 by archaeologist Larry James. A single survey transect was extended down the center of the 1000-foot-long and 100-foot-wide proposed ROW. Shovel tests were excavated every 100 feet along this transect. Each shovel test measured approximately one foot in diameter and was excavated until reaching culturally sterile soil, the depth of which varied across the survey stands. The fill from all shovel tests was sifted through one-quarter-inch mesh hardware cloth. The investigator recorded information relating to each shovel test and soil profile in field notebooks. This information included the content (e.g., presence or absence of cultural materials) and context (e.g., soil color, texture, stratification) of each test. Also noted was the environmental setting near each shovel test (e.g., hardwoods, marsh). All shovel tests were backfilled upon completion. The ground surface was also visually inspected. No shovel tests were excavated in wetlands, heavily disturbed or eroded areas, or on slopes greater than 15 degrees.

The 1000-foot-long and 100-foot-wide proposed ROW extends north-south along the existing corridor and extends adjacent to the eastern side of Pepperhill Substation facility (see

Figure 3). Shovel tests were excavated at 100-foot intervals along a single transect placed down the center of the proposed ROW. Approximately 20 percent of the proposed ROW, located on its southern extreme, extends across disturbed area or is undulated by water. Disturbed areas include portions of the gravel parking lot, dirt roads, and graded areas from utility pole installation or the Pepperhill Substation construction. A total of 7 shovel tests were excavated. No cultural resources were identified.

3.4 Recommendations

Archaeological survey for the new Williams - Pepperhill 230 kV Transmission Tie Line at the Pepperhill Substation site included background research and archaeological field investigations. No cultural resources were identified within the proposed ROW. The proposed project should be allowed to proceed as planned.

References Cited

Agha, Andrew, Charles F. Philips, Jr., Edward Salo, Jason Ellerbee, and Joshua N. Fletcher
2008 Cultural Resources Survey of the Palmetto Commerce Parkway Extension Project, Charleston County, South Carolina. Prepared for THE LPA GROUP INCORPORATED, Columbia. Prepared by Brockington and Associates, Inc., Charleston.

Council of South Carolina of Professional Archaeologists (COSCAPA), South Carolina Department of Archives and History (SCDAH), State Historic Preservation Office (SHPO), and the South Carolina Institute of Archaeology and Anthropology (SCIAA)
2013 *South Carolina Standards and Guidelines for Archaeological Investigations.* Electronic document available at http://www.coscapa.org/standards-and-guidelines.html, accessed February 13, 2017.

Fletcher, Josh
2014 Cultural Resources Survey of the Summerville-Pepperhill 230 kV Transmission Line, Berkeley and Charleston Counties, South Carolina. Report prepared for UC Synergetic, LLC Fort Mill, South Carolina. Report prepared by Brockington and Associates, Mt. Pleasant, SC.

James, Larry and Charles Philips
2018 Cultural Resources Survey of the Windsor Hill Tract Charleston County, South Carolina. Report prepared for Lennar Homes SC, South Carolina. Report prepared by Brockington and Associates, Mt. Pleasant, SC.

Poplin, Eric
2018 Archaeological Survey of TMS 3930000432, Charleston County, SC. Letter Report prepared for JMA Management Group, Macomb, Michigan. Report prepared by Brockington and Associates, Mt. Pleasant, SC.

Trinkley, Michael
1983 Archaeological investigations at the Ashley Phosphate Road Woodlands borrow pit, Charleston County, State File No 10.969, F.A. No. F-081(89). South Carolina Department of Transportation, Columbia, SC.

Brockington
CULTURAL RESOURCES CONSULTING

Mr. Nathan Bass
UC Synergetic, LLC
123 North White Street
Fort Mill, SC 29715

April 20, 2018

Re: Literature Review and Reconnaissance of the Proposed Pepperhill-Summerville 230 kV Line

Dear Mr. Bass:

On April 9, 2018, UC Synergetic, LLC (UCS) contracted with Brockington and Associates, Inc. (Brockington) to conduct a literature review and windshield reconnaissance update for the proposed Pepperhill-Summerville 230kV Line located near the juncture of Berkeley, Charleston, and Dorchester counties, South Carolina. This is an existing transmission corridor and the project would include replacing existing 230kV single-circuit H-frame structures with single-pole double-circuit towers. No new right-of-way would be required.

This letter report represents an update to an earlier windshield study conducted in 2012 (Wagoner 2012). However, since that time, there have been several additional architectural resources recorded in the study area, specifically during a Charleston County planning level survey completed in 2016 (Reed et al. 2016). Given the significant overlap of those resources with buildings we identified as potentially eligible for the National Register of Historic Places (NRHP) in 2012, we have prepared a new, clean set of data.

This investigation is a due-diligence effort designed for planning purposes in siting the proposed line so that any potentially significant cultural resources may be considered during the siting process. This level of effort does not constitute fulfilment of more intensive studies that would be required under Section 106 of the National Historic Preservation Act (NHPA), should that law become applicable in this project.

Literature Review for Known Cultural Resources

Previous Cultural Resources Surveys and Archaeological Sites

Data for previous cultural resources surveys and known archaeological sites and surveys were collected through ArchSite, the South Carolina State Historic Preservation Office (SHPO) repository for cultural data. ArchSite includes information on NRHP listed properties, resources recorded during Section 106 investigations, and resources recorded through surveys for counties and municipalities. There have been several environmental review (Section 106 or due-diligence) efforts within the study area and each is itemized in Table 1. Concurrent to this windshield study, a survey was conducted for a small segment of the Williams-Pepperhill 230kV tie line corridor adjacent to the Pepperhill substation (James 2018). No archaeological materials were encountered during the survey and that letter report addendum will be submitted to the South Carolina SHPO for review and approval.

A previous survey (Fletcher 2014) was conducted on the Pepperhill-Summerville 230kV transmission line and included a re-visit of three previously recorded sites. No

evidence of eligible Site 38CH230 was encountered within the transmission line corridor. Another potentially eligible site, 38CH1014, was determined to have been destroyed. Fletcher (2014) also mapped previously recorded site 38CH2159, the remnants of an inland rice system within the existing corridor. The South Carolina SHPO reviewed and approved the following assessment:

> The current investigations…resulted in the slight extension of the western mapped limits of 38CH2159 within the transmission line corridor, as well as a newly recorded portion of the site to the north of the Pepperhill substation. Site 38CH2159 remains eligible for the NRHP and the placement of new single-pole double-circuit towers within existing cleared areas should avoid/span ditches and embankments that are elements of the site. The newly recorded portion of 38CH2159 to the northwest of the Pepperhill substation is located within a relatively undisturbed wooded area. If trees are to be removed from the approximately 50-foot (ft)-wide strip along the southern edge of the wooded area, caution should be exercised in the area of and adjacent to the embankment and ditches associated with Site 38CH2159. Trees and vegetation in this area should be carefully removed by hand (i.e., no heavy machinery on the embankment and ditches) to avoid an adverse effect to Site 38CH2159. Given that inland rice field elements of NRHP-eligible Site 38CH2159 are avoided/spanned, and wooded areas adjacent to and on the embankment and ditches to the northwest of the Pepperhill substation are cleared by hand, proposed land-disturbing activities in the Summerville-Pepperhill 230 kV Transmission Line project will not affect any historic properties and should be allowed to proceed without further management consideration. If these embankments/ditches cannot be avoided, then all proposed mitigation of adverse effects to Site 38CH2159 will be developed in consultation with [SCSHPO] (Fletcher 2014: ii).

Another recent survey (James and Philips 2018) revisited Site 28CH230 and redefined its boundaries. The current boundary (per the dataset) reflects the 70 acres of undeveloped uplands of the Windsor Hill Plantation, and did not include lands within the existing transmission corridor. Finally, Brockington recently revisited archaeological sites 38CH663-667, and 38CH674 (Poplin 2018). The results of the technical report and SHPO determination are pending landowner permit application processing, but each of the sites have been recommended not eligible.

There are 48 archaeological sites recorded within the study area. Twenty-four (24) are recommended as not eligible or probably not eligible, but all would be re-visited in a standard Section 106 survey. The remaining sites are noted as potentially eligible or eligible and physical impacts should be avoided is possible. The associated GIS dataset provides additional detail and a summary is provided in Table 2 below.

Table 1. Cultural Resources Investigations Within the Study Area.

Survey Name	Reference
Archaeological survey of Ashley Phosphate rd. Woodlands borrow pit	M. Trinkley 1983
Archaeological survey of US 78/S-169/S-535 and S-76/S-1120 intersections	D. Ramsey-Styer 1996

Addendum to Archaeological and Architectural Investigations of the Ladson Road Widening from US 78 to Eagle Circle	South Carolina DOT 1998
Archaeological and Architectural Survey of the Proposed I-26 Widening Improvements	C.S. Butler 1995
CR Survey of Selected Portions of the Weber Research Tract	R. Bailey et al. 2005
CR Survey of the Fabian Tract	McMakin and Bailey 1997
Cultural Resources Survey of the Victoria Tract 3 at Palmetto Commerce Park, Charleston County, SC	R. Bailey and S. Wolf 1998
CR Survey of the Palmetto Commerce Park Tract	R. Bailey and M. Chambliss 2005
Addendum to: CR Inventory of the Proposed Ashley Phosphate Road Improvements Corridor	Roberts, W. 2004
CR Survey of the CPW at I-26 and US Route 78	K. Shuler et al. 2004
CR Survey of the Heape Tract	M. Trinkley et al. 2006
Intensive CR Assessment Survey of the Colony North Parcel	M. Bland 2006
CR Survey of the American LaFrance Tract	R. Bailey et al. 2006
Cultural Resources Reconnaissance Treeland and Bland Farm Residential Development, 85-Acre Tract	P. Morgan 2007
Cultural Resources Survey of the Jamestown Tract	Bailey et al. 2007
Cultural Resources Survey of the Dasinger Tract	J. Fletcher 2007
Cultural Resources Reconnaissance Survey of Approximately 63 Acres at the Proposed Palmetto Industrial Park	Ogden and Carpini 2014
CRIS of Approximately 396 Acres at the J.L. Woode, Ltd. Property in Ladson	Pope 2014
Cultural Resources Survey of the Summerville-Pepperhill 230kV Transmission Line, Berkeley and Charleston	Fletcher 2014
Transco to Charleston Project - Phase I Cultural Resources Survey Report Transco to Charleston Project Dillon Pipeline and Moore to Chappells Pipeline	AECOM 2016
Cultural Resources Survey of the Palmetto Commerce Interchange Project	Brockington 2017
CR Inventory of the Proposed Ashley Phosphate Rd. Improvement Corridor	B. Harvey and K. Bridgman 1999
Phase I Cultural Resources Survey of I-26/Sheep Island Parkway Corridor	Gantt 2009
Cultural Resources Survey of a 2.25-Mile Section of the Proposed US Highway 78 Phase 3 Improvements Project	Baluha et al. 2016
Archaeological survey of proposed Ladson-Goose Creek Connector	M. Trinkley and L. Tippett 1979
Archaeological & Architectural survey of the Ladson Rd. widening from US 78 to Eagle	V. Marcil 1998
Archaeological survey of Rt. S-2028 Improvement	O. Caballero 1992
Archaeological survey of US 78 Improvements Project	S. Shumate 1993
Palmetto Commerce Parkway Extension Project	A. Agha, C. Philips, and E. Salo 2007
Phase I Cultural Resources Survey of the St. George-Summerville 230kV Transmission Line, Berkeley and Dorchester Counties	O'Neal and Hanbury 2014
Archaeological Survey for a segment of the Williams - Pepperhill 230 kV Line, Charleston County, South Carolina: Addendum Report	James 2018 (new, not mapped)
Archaeological Survey of TMS 3930000432, Charleston County	Poplin 2018 (official results pending)
Berkeley County Historical and Architectural Inventory (countywide)	Schneider et al. 1989
Charleston County Historic Resources Survey Update (countywide)	Reed et al. 2016

Dorchester County, South Carolina Historic Resources Survey (countywide)	Fick and Davis 1997

Table 2. Archaeological Sites (N=48) Within the Study Area.

Site #	Site Type	NRHP Status
38BK1011	Historic period site	Potentially Eligible
38BK1034	Historic period site	Potentially Eligible
38BK1035	Unknown	Potentially Eligible
38CH0230	Historic period site	Eligible - boundary re-definition in progress
38CH0662	Early Woodland; unknown Post-Contact scatter	Potentially Eligible
38CH0663	Late Archaic; 19th-20th century scatter	Potentially Eligible/Pending New Assessment of Not Eligible
38CH0664	Woodland; 19th century scatter	Potentially Eligible/Pending New Assessment of Not Eligible
38CH0665	19th century scatter	Potentially Eligible/Pending New Assessment of Not Eligible
38CH0666	19th century scatter/possible homesite	Potentially Eligible/Pending New Assessment of Not Eligible
38CH0667	19th century scatter	Potentially Eligible/Pending New Assessment of Not Eligible
38CH0668	19th century scatter	Potentially Eligible
38CH0669	Historic period site	Potentially Eligible
38CH0673	18th-19th century scatter	Potentially Eligible
38CH0674	Historic period site	Potentially Eligible/Pending New Assessment of Not Eligible
38CH1014	18th-19th century homesite	Potentially Eligible
38CH1015	Middle-Late Woodland scatter	Probably Not Eligible
38CH1016	Early-Middle Woodland ceramic scatter	Probably Not Eligible
38CH1674	18th-20th century Woodstock Plantation main house and cemetery	Eligible/Contributes to Eligible District
38CH1675	19th-20th century Woodstock railroad station	Eligible/Contributes to Eligible District
38CH1676	Historic period site	Potentially eligible
38CH1688	Historic period site	Probably Not Eligible
38CH1689	Historic period site	Probably Not Eligible
38CH1704	Historic scatter	Probably Not Eligible
38CH2042	Prehistoric and historic scatter	Probably Not Eligible
38CH2043	Prehistoric and historic scatter	Probably Not Eligible
38CH2045	Prehistoric and historic scatter	Probably Not Eligible
38CH2054	Unknown Pre-Contact; 17th-19th century Woodstock Plantation slave settlement	Potentially Eligible
38CH2055	Unknown Pre-Contact and Post-Contact scatter	Not Eligible
38CH2056	Unknown Pre-Contact; 20th century scatter	Not Eligible
38CH2057	Unknown Pre-Contact; 19th century scatter	Not Eligible
38CH2058	Unknown Post-Contact scatter	Not Eligible
38CH2059	Unknown Pre-Contact scatter	Not Eligible
38CH2060	19th-20th century scatter/homesite	Not Eligible
38CH2061	19th-20th century scatter	Not Eligible
38CH2062	unknown Pre-Contact; 19th-20th century scatter	Not Eligible

38CH2063	Unknown Pre-Contact scatter	Not Eligible
38CH2068	17th-19th century inland rice field system	Contributes to Eligible District
38CH2075	Unknown scatter	Not Eligible
38CH2090	Prehistoric scatter	Probably Not Eligible
38CH2159	18th-19th century inland rice field system	Eligible
38CH2161	Historic scatter	Probably Not Eligible
38CH2162	Historic scatter	Probably Not Eligible
38CH2163	Historic scatter	Probably Not Eligible
38CH2295	18th-19th century scatter	Potentially Eligible
38CH2296	20th century scatter	Probably Not Eligible
38CH2463	18th-19th Century; possible rice bank	Potentially Eligible
38DR0144	19th-20th century scatter	Probably Not Eligible
38DR0252	18th-19th period site with partial brick wall	Potentially Eligible

Historic Architecture

The literature review was also designed to determine if any historic architectural properties have been recorded within the study area. This research included a review of all previously recorded above-ground resources on file through ArchSite or locally in the respective counties, each of which has had a countywide survey. Berkeley, Dorchester County, and Charleston County all had surveys during the 1990s and eight (8) of those resources fell within the study area. Given the age of these surveys, we reassessed each of those resources during our windshield survey. Alternatively, another Charleston County survey was completed in 2016 (Reed et al. 2016) and included 98 resources that fell within the study area. None of the resources were determined eligible. The remaining architectural resources were largely recorded during Section 106 surveys and there is an additional resource in the dataset that was recorded as a "historic area." This is the Jones Cemetery, which has been determined not eligible. Table 3 itemizes the properties along with their disposition, NRHP status, and any reassessments from the windshield survey. Attachment 1 provides selected photographs.

Table 3. Previously Recorded Architectural Resources (n=116) in the Study Area.

Resource #	Name/Address	Date	NRHP Status/Windshield Assessment (if different)
Jones Cemetery	Jones Cemetery/Within median to box store development	1905-1927	Not Eligible
N/A	Woodstock Cemetery	c. 1763-1821	Eligible/Inaccessible
1265	405 E 5th N St.	c. 1950	Not Eligible
276-1102	Ashley Phosphate Rd. 0.25 mi W of Moultrie	c. 1950; c. 1970	Not Eligible/Demolished
276-1103	3725 Ashley Phosphate Road	c. 1940; c. 1960	Not Eligible/Demolished
276 0007	Goose Creek Huguenot Church Marker; I-26 vicinity, west side, 0.4 mile south of SSR 62	1910	Not Eligible/Inaccessible
346 0010	Unnamed House; SSR 715, east side, 0.6 mile northeast of US 78	c. 1900	Not Eligible/Demolished
496 0253.00	Unknown; 1005 North Gum Street	c. 1925	Not Eligible/BA 2018: potentially eligible
496 0253.01	Unknown; 1003 North Gum Street	c. 1925	Not Eligible/BA 2018: potentially eligible
496 0253.02	Merry Maid Dairy, North Gum	c. 1910	Not Eligible/BA 2018:

	Street		potentially eligible
496 0717	House, East Meeting Street	1890	Eligible
496 0718	Wesley Methodist Church, 736 Front Street	1887	Not Eligible/BA 2018: potentially eligible
496 0719	Mt. Zion Baptist Cemetery; 360 Dunmeyer Hill Road	1900	Not Eligible
5071	Lincolnville School; 141 W. Broad Street	1923-1924	Not Eligible
5088	7720 Chippendale Road	1952	Not Eligible/Demolished
5089	7703 Midwood Drive	c. 1950	Not Eligible/Demolished
6382	House at 9239 Black Bottom Road	N/A	Not Eligible
6383	House at 9360 Koester Road	N/A	Not Eligible
6577	672 McGee Road	1968	Not Eligible
6578	500 Owens Drive	1952, c. 2000	Not Eligible
6579	504 Owens Drive	N/A	Not Eligible
6580	506 Owens Drive	1958	Not Eligible
6581	507 Owens Drive	1950	Not Eligible
6582	509 Owens Drive	1965	Not Eligible
6583	105 Jandrell Road	1960	Not Eligible
6584	10641 US 78	1957	Not Eligible
6585	10613 US 78	1966	Not Eligible
6586	10611 US 78	1960	Not Eligible
6587	10605 US 78	N/A	Not Eligible
6588	10610 US 78	N/A	Not Eligible
6589	10573 US 78	N/A	Not Eligible
6590	10581 US 78	1960	Not Eligible
6591	10587 US 78	1977	Not Eligible
6592	US 78	1970	Not Eligible
6593	10533 US 78	1970	Not Eligible
6594	US 78	1965	Not Eligible
6595	10471 US 78	1960	Not Eligible
6596	10453 US 78	1975	Not Eligible
6597	297 Dunmeyer Hill Road	1950	Not Eligible
6598	360 Dunmeyer Hill Road	1968	Not Eligible
6599	3240 Mill Street	1941	Not Eligible
6600	3220 Mill Street	1946	Not Eligible
6601	10395 US 78	1970	Not Eligible
6602	10383 US 78	N/A	Not Eligible
6603	10353 US 78	1965	Not Eligible
6604	10349 US 78	1961	Not Eligible
6605	3288 Von Oshen Road	1960	Not Eligible
6606	3304 Von Oshen Road	1940	Not Eligible
6607	3334 Von Oshen Road	1942	Not Eligible
6608	3356 Von Oshen Road	1959	Not Eligible
6609	3385 Von Oshen Road	1965	Not Eligible
6610	3375 Von Oshen Road	1956	Not Eligible
6611	3371 Von Oshen Road	1969	Not Eligible
6612	3353 Von Oshen Road	1953	Not Eligible
6613	3347 Von Oshen Road	1947	Not Eligible
6614	3341 Von Oshen Road	1966	Not Eligible
6615	3325 Von Oshen Road	1945	Not Eligible

6616	3283 Von Oshen Road	1969	Not Eligible
6616.01	3283 Von Oshen Road	1969	Not Eligible
6617	Mistletoe Lane	1970	Not Eligible
6618	3408 Lincolnville Road	1969	Not Eligible
6619	9370 Koester Road	1945	Not Eligible
6620	9360 Koester Road	1936	Not Eligible
6620.01	9360 Koester Road	1936	Not Eligible
6620.02	9360 Koester Road	1936	Not Eligible
6620.03	9360 Koester Road	1936	Not Eligible
6620.04	9360 Koester Road	1936	Not Eligible
6620.05	9360 Koester Road	1936	Not Eligible
6620.06	9360 Koester Road	1936	Not Eligible
6621	9389 Koester Road	1970	Not Eligible
6622	9432 Koester Road	1957	Not Eligible
6623	9481 Koester Road	1970	Not Eligible
6624	9485 Koester Road	1967	Not Eligible
6625	9528 Koester Road	N/A	Not Eligible
6626	9520 Koester Road	1961	Not Eligible
6627	9525 Koester Road	1954	Not Eligible
6628	9489 Koester Road	N/A	Not Eligible
6629	Corner of Ladson Road and Koester Road	1951	Not Eligible
6630	3355 Ladson Road	1954	Not Eligible
6631	3351 Ladson Road	N/A	Not Eligible
6632	3348 Ladson Road	1951	Not Eligible
6633	9634 Dusty Lane	1950	Not Eligible
6634	9670 Dusty Lane	1970	Not Eligible
6635	9654 Dusty Lane	1950	Not Eligible
6636	9635 Dusty Lane	1950	Not Eligible
6637	3350 Ladson Road	1949	Not Eligible
6638	3293 Ladson Road	1975	Not Eligible
6639	3287 Ladson Road	1955	Not Eligible
6640	Ladson Road	1971	Not Eligible
6641	Church at 3250 Ladson Road	Remodeled 1965	Not Eligible
6642	Ladson Road	N/A	Not Eligible
6643	Church at 3288 Ladson Road	1912	Not Eligible
6643.01	Cemetery at 3288 Ladson Road	N/A	Not Eligible
6644	Ladson Road	N/A	Not Eligible
6645	3312 Ladson Road	1969	Not Eligible
6646	4468 Midview Drive	N/A	Not Eligible
6647	4444 Jenwood Street	1973	Not Eligible
6648	4429 Jenwood Street	1973	Not Eligible
6649	4413 Jenwood Street	1973	Not Eligible
6650	4412 Jenwood Street	1973	Not Eligible
6651	10127 US 78	1973	Not Eligible
6652	3263 Miller Drive	1968	Not Eligible
6653	3267 Miller Drive	1960	Not Eligible
6654	3271 Miller Drive	N/A	Not Eligible
6655	3275 Miller Drive	1959	Not Eligible
6656	3252 Pinewood Drive	N/A	Not Eligible
6657	3234 Clairmont Drive	N/A	Not Eligible

6658	3225 Clairmont Drive	N/A	Not Eligible
6659	3224 Clairmont Drive	1936	Not Eligible
6660	3236 Heaton Drive	1970	Not Eligible
6661	3157 Ancrum Road	1960	Not Eligible
6662	9533 US 78	1960	Not Eligible
6663	9430 US 78	1971	Not Eligible
6664	9442 US 78	1953	Not Eligible
6665	9454 US 78	1971	Not Eligible
6666	9534 US 78	1960	Not Eligible

Windshield Reconnaissance for Historic Architecture

On April 11-12, 2018, the project historian conducted a windshield reconnaissance of the study area. As outlined in National Register Bulletin #24, a windshield reconnaissance-level survey is useful in ascertaining "a general picture of the distribution of different types and styles [of architectural resources], and of the character of different neighborhoods" (Parker 1985:35-36). Windshield surveys are also useful for making preliminary assessments of eligibility based on the architectural integrity of properties, but not in ascertaining the historical associations a property might possess.

The reconnaissance consisted of a vehicular inspection of architectural resources visible from all publicly accessible roads within the study area. When a comparison of current and historic topographic or aerial maps indicated properties located along private roads or abandoned and existing field roads, we supplemented our work through a review through aerial photography. In general, visibility to most properties was acceptable, although some private properties distanced from roadways were not visible. The purpose of our windshield reconnaissance was to:

1. Evaluate all previously recorded architectural resources (if any);
2. Locate/assess architectural resources not previously recorded and that appear to meet the minimum fifty-year age requirement for the NRHP, and
3. Identify potentially eligible NRHP properties and mark them in the GIS data set.

In general, our windshield survey employed the following approach to assessing previously recorded properties for the NRHP. Properties recorded during county-wide surveys and subsequently evaluated by the South Carolina SHPO were assessed according to their documented determinations of eligibility (eligible or not eligible). For any eligible properties that have been subjected to recent substantial and irreversible alterations, we assessed them as not eligible. Alternatively, if an older survey determined a property as not eligible, we made liberal assessments based on 1) more recent experiences with SHPOs preferences for certain types of architecture and 2) properties that appear to be better representations of architecture in the study area. For instance, certain properties originally determined not eligible may be considered potentially eligible today if they have been given sympathetic historic restoration efforts. Properties with relatively recent formal evaluations through Section 106 compliance actions or the Charleston County survey (Adams et al. 2016) retain the official SHPO determination of eligibility.

Any newly identified properties were assessed based on a review of their architectural integrity as visible from the public right-of-way, any historical associations uncovered during the literature review or in consideration of any recent SHPO determinations for comparable types of architecture. Further, there was significant overlap between our previous windshield survey (Wagoner 2012) and the Charleston County survey by Reed et al. (2016). The duplicated resources were all recently determined ineligible by the SHPO. Therefore, we developed a new set of windshield data. Photographs were taken of previously recorded and newly identified resources where practicable and allowable by traffic and safety. Photographs are provided in Attachments A and B.

The Pepperhill-Summerville study area is located at the juncture of three counties: Charleston, Berkeley, and Dorchester. The area is heavily suburban and stretches from Alternate (Alt) 17/I-26 at the north to near Ashley Phosphate Road in the south. Both I-26 and US78 bisect the study area from north to south. The new Palmetto Commerce Parkway provides access to emerging industrial and commercial development in the southern half of the corridor. The area features two general phases of residential development. There are large subdivisions with lower to medium income housing dating to the 1960s-1980 south of Summerville on the west side of US78. Similar type developments are located off Ashley Phosphate Drive (Pepperhill Subdivision) and College Park Road. These mid-to-late twentieth century developments, largely composed of small linear ranch houses. These areas are interspersed with more modern residential subdivisions. Commercial development is most prevalent along Alt 17 in the northern portion of the study area, Ladson Road near the center, and Ashley Phosphate Road in the south. The majority of older (i.e. 50+ years of age) buildings within the study area are generally located along US78, Ladson Road, roadways in community of Lincolnville, Van Oshen Road, and Royle Road.

In general, the area's oldest building stock has been impacted by incompatible alterations such as replacement siding, windows, doors, or porch modifications. As evidenced by the general conclusions of the most recent survey (Reed et al. 2016), most buildings have been adversely affected by incompatible architectural alterations (replacement siding, windows, doors, etc.) or the buildings have been determined not to represent a significant type of architecture. Specifically, most of the mid-twentieth century styled houses represent the ranch style, but none exhibit expressive ranch features beyond their basic linear form. None of the ranch type houses recorded by Reed et al. within the study area (2016) were determined eligible for the NRHP. We observed numerous additional ranch styled homes during our windshield survey in all three counties, but found none that would be considered NRHP eligible.

The study area includes no previously identified historic districts nor did we observe any distinctive collection of architecture during our windshield survey. Again, while the study area has several mid-twentieth century developments, we do not believe these subdivisions meet the NRHP criteria of eligibility. We also reviewed the community of Lincolnville, which was established by African Americans after the Civil War. The community possesses a clear pattern of streets, but it does not exhibit any distinctive collection of historic architecture. The older buildings present have been altered by incompatible replacement materials, there are numerous empty lots, and in general does not possess the feeling of a cohesive district. There is a previously recorded church (c1887; Resource 496-0718) on Front Street that was

previously determined ineligible during a 1991-1992 countywide survey (Fick et al. 1992). Given the date of the survey and renewed interest in historic African American resources, we recommend this resource as potentially eligible.

There are three (3) additional resources previously determined to be not eligible that we feel should be considered eligible for purposes of project planning. These three buildings are part of a remnant farm complex on North Gum Street near Summerville. The buildings appear to be in good condition and represent surviving examples of an agricultural operation in a heavily developed area. However, given the amount of surrounding modern development, it is unlikely that the proposed transmission line would result in an adverse visual effect.

In summary, South Carolina SHPO records identify a total of 116 previously recorded architectural resources in the study area. The vast majority were recorded during the 2016 Charleston County Survey (Reed et al. 2016). Five (5) of the resources have been demolished. Six (6) properties have been determined eligible or we have reassessed as potentially eligible. Additional detail is provided in the associated GIS dataset.

During the reconnaissance, we identified two new architectural resources (SP-1 and SP-2) that appear to retain sufficient integrity to be considered potentially eligible for the NRHP. These include one house in Berkeley County along US78 and another house on Lincoln Road near Lincolnville (Attachment B). Where possible, architectural properties identified as listed, eligible, or potentially eligible for the NRHP should be avoided and visual effects considered during project planning. However, given the use of the existing right-of-way for the new line, it is unlikely that any of the resources would have visibility of the new utility structures.

As noted, we observed numerous other properties that appear to be 50 years old (thus, meeting the minimal standard for NRHP eligibility consideration) distributed throughout the study area; these are properties that would be recorded by an architectural historian to satisfy National Historic Preservation Act (NHPA) Section 106, if regulatory compliance is required. Due to alterations or modifications, these properties appear to have lost their architectural integrity and may not meet the criteria of eligibility for listing on the NRHP under Criterion C. However, these properties might possess historical significance that could only be determined through more detailed archival research. We did not attempt to plot each of these resources in our GIS dataset.

The attached Resource Map detail the findings from both the literature review and windshield reconnaissance. The projection used to develop the map and shapefiles was NAD 1983 UTM Zone 17. Should you have any questions about the GIS data or property recommendations, please do not hesitate to send me an email (patriciastallings@brockington.org) or call 678-638-4126.

Sincerely,

F. Patricia Stallings
Senior Historian

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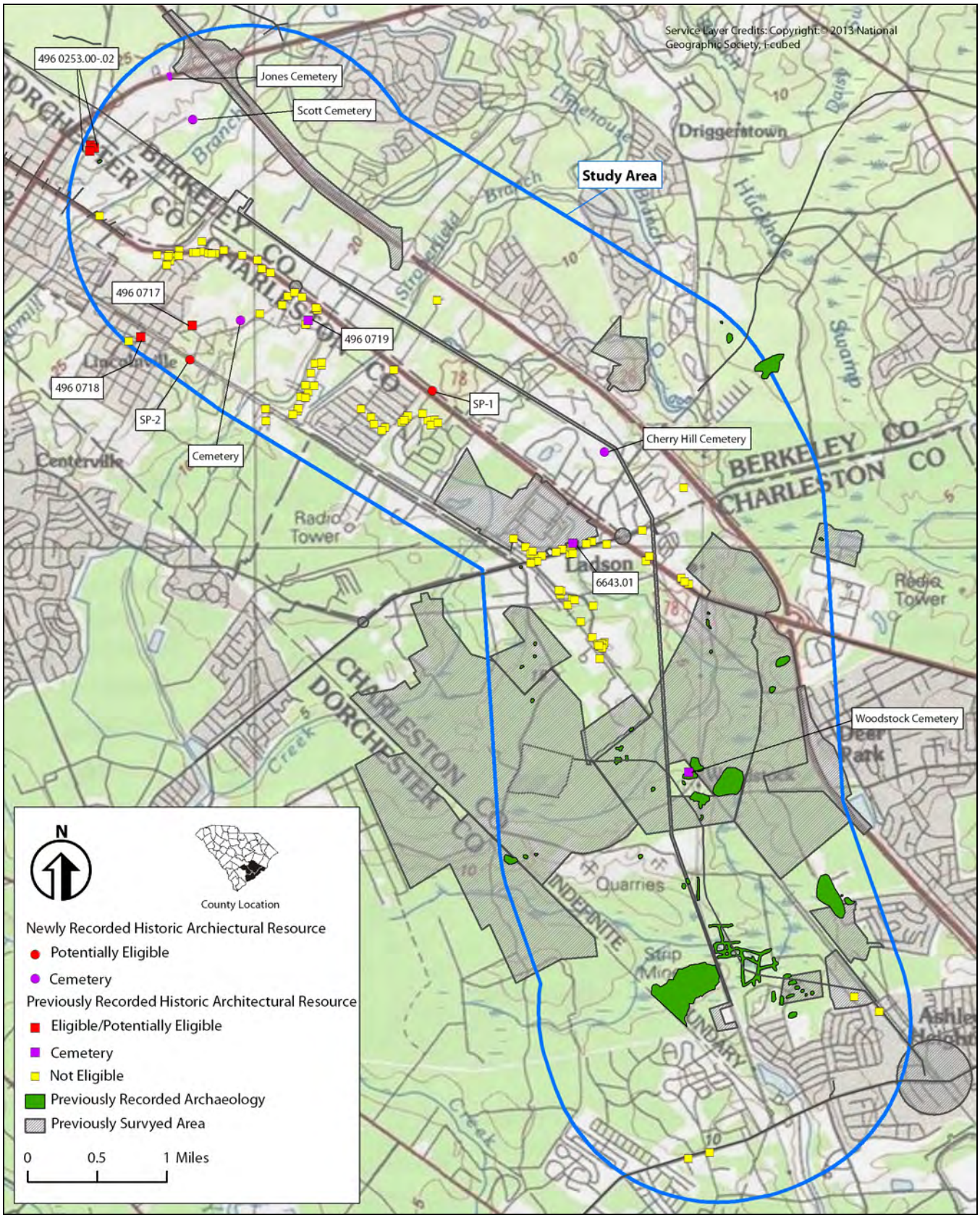

Figure 1. Study Area, Resource Map #1 (see GIS data for additional detail).

Attachment A
Previously Recorded Resources

Jones Cemetery

Resource 496 0253, Agricultural Complex, North Gum Street (Potentially Eligible)

Resource 496 0253, Agricultural Complex, North Gum Street (Potentially Eligible)

Resource 1265, 405 E 5th North St

Resource 6583, 105 Jandrell Road

Resource 6581-6582, 507 and 509 Owens Road

Resource 496 0717, East Meeting Street (Determined Eligible)

Resource 496 0718, 736 Front Street, Lincolnville (recommended potentially eligible)

Resource 5071, 141 West Broad Street, Lincolnville

Resource 6618, 3408 Lincolnville Road

Resource 6610, 3375 Van Oshen Road

Resource 6646, 4468 Midview Drive

Resources along Jenwood Drive

Resources along Miller Drive

Resource 6658, 3225 Clairmont Drive

Resource 6616, 3218 Van Oshen Road

Resource 6616.01, 3218 Van Oshen Road

Resource 6600, 3220 Mill Street

Resource 6599, 3420 Mill Street

Resource 496 0719, Mt. Zion Cemetery, Dunmeyer Hill Road

Resource 6641, 3520 Ladson Road

Resource 6642, Ladson Road

Resource 6643, 3288 Ladson Road

Resource 6645, 3312 Ladson Road

Resource 6632, 3348 Ladson Road

Resource 6637, 3350 Ladson Road

Resource 6631, 3351 Ladson Road

Resource 6630, 3355 Ladson Road

Resources 6633 and 6636, 9634 and 9635 Dusty Lane

Resource 6629, Corner of Ladson Road and Koester Road

Resource 6626 and 6625, 9520 and 9528 Koester Road

Resource 6627, 9525 Koester Road

Resource 6619, 9370 Koester Road

Resource 6620 (agricultural complex), 9360 Koester Road

Resource 6382, 9239 Black Bottom Road

Resource 6640, Ladson Road

Resource 6662, 9533 US 78

Attachment B
Newly Identified Resources

SP-1, US78

SP-2, Lincolnville Road.